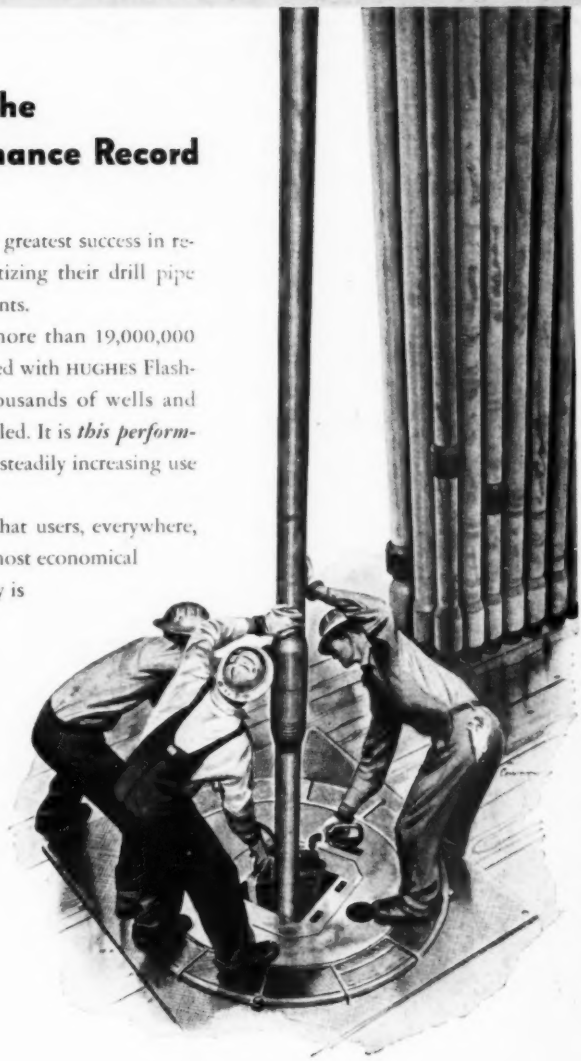
the OIL AND GAS JOURNAL


## The Tool Joint with the Proven Performance Record

Operators who are having the greatest success in reducing drill stem failures are unitizing their drill pipe with HUGHES Flash-Weld tool joints.

Over a period of 12 years, more than 19,000,000 feet of drill stem have been unitized with HUGHES Flash-Weld joints. This represents thousands of wells and many millions of feet of hole drilled. It is *this performance record* that accounts for the steadily increasing use of HUGHES unitized drill stem!

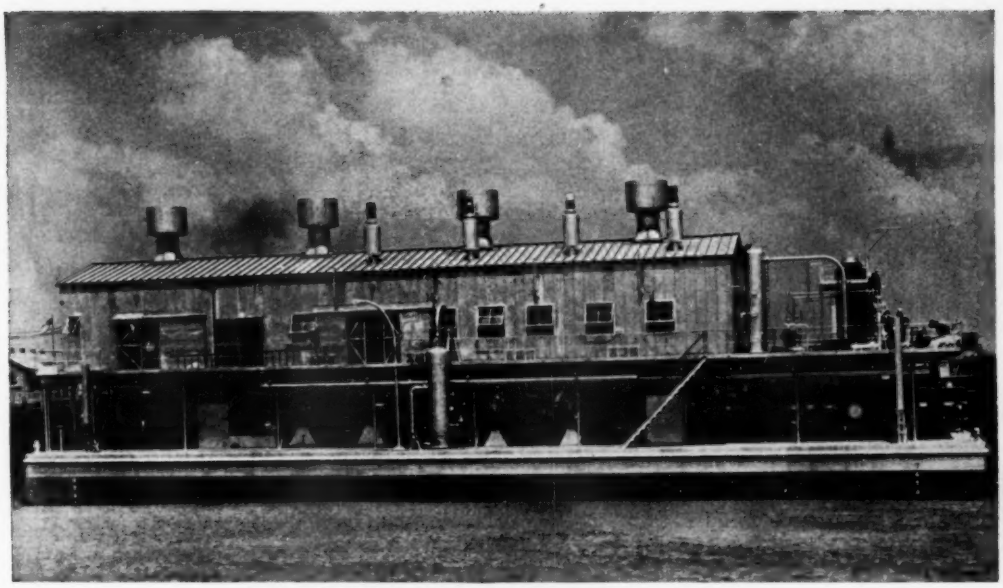
It also accounts for the fact that users, everywhere, will tell you that the strongest...most economical ...and safest tool joint you can buy is HUGHES Flash-Weld.



FLASH-WELD
A DEVELOPMENT OF
HUGHES
TOOL COMPANY
HOUSTON, TEXAS


PRICE 50 CENTS TABLE OF CONTENTS PAGE 33 JULY 5, 1951

Wyatt FABRICATED TOWERS
on their way
TO POINTS THROUGHOUT THE WORLD
Wyatt's
HOUSTON-DALLAS-NEW YORK-TULSA
TEXAS RANGER



*Developed by Bethlehem and Gulf Refining Company engineers, the first completely integrated Submersible Compressor Barge was built by Bethlehem's Beaumont Yard.*

# Bethlehem's Submersible Compressor Barge

***For the Most Economical Working of Low Pressure Natural Gas in Shallow Water or Marshland***

Length, 128 ft Width, 36 ft Depth, 10 ft

Five 300 hp Compressors

Daily Capacity 15,000,000 cu ft at 800 psi pressure.

- ★ Completely Integrated . . . Ready to Hook up to the Well.
- ★ Eliminates Need for Costly Erection Crews Miles from their Base.
- ★ Eliminates Need for Expensive Pile and Concrete Platforms.
- ★ Mobility, if and when Necessary.
- ★ 100 Per Cent Salvage.

Our engineers will be happy to supply further details on request.

**SHIP REPAIR YARDS**

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| Boston Harbor | New York Harbor |
| Baltimore Harbor | Beaumont, Texas |
| Los Angeles Harbor | San Francisco Harbor |

**SHIPBUILDING YARDS**

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***SHIPBUILDERS*** ***SHIP REPAIRERS***

**BETHLEHEM STEEL COMPANY**

*Shipbuilding Division*

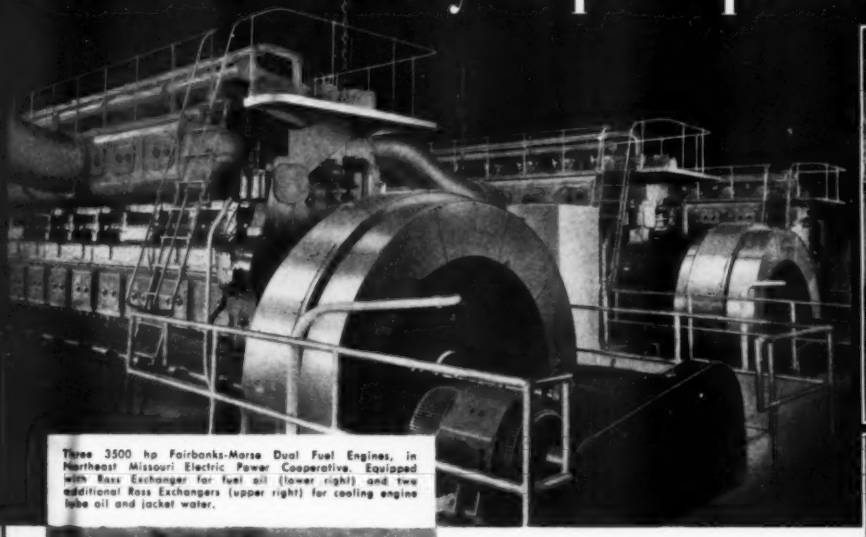
General Offices: 25 Broadway, New York 4, N. Y.

On the Pacific Coast shipbuilding and ship repairing are performed by the Shipbuilding Division of Bethlehem Pacific Coast Steel Corporation

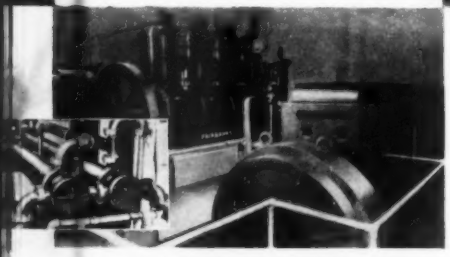
The Oil and Gas Journal, published Thursdays by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $3 yearly. Copyright 1951.

*Fairbanks-Morse Diesels*

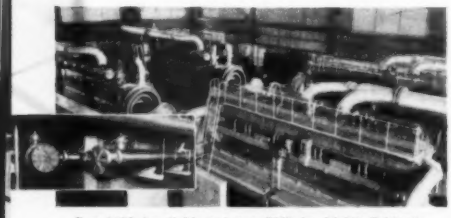
# Count on stability of principal accessories



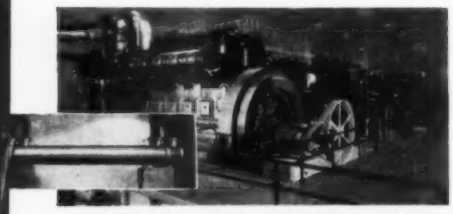
Three 3500 hp Fairbanks-Morse Dual Fuel Engines, in Northeast Missouri Electric Power Cooperative. Equipped with Ross Exchanger for fuel oil (lower right) and two additional Ross Exchangers (upper right) for cooling engine lube oil and jacket water.



480 hp Fairbanks-Morse Dual Fuel Engine in Hugo, Colorado plant of K. C. Electric Assn. Lube oil and jacket water cooling by 2 Ross Exchangers (inset).



Two 1600 hp (left) and two 2000 hp (right) Fairbanks-Morse Dual Fuel Engines supplying power for Halliburton Portland Cement Co., Corpus Christi, Texas. Equipped with Ross Exchangers (inset) for lube oil and jacket water.



2000 hp Fairbanks-Morse Diesel (foreground) newest of 5 totaling 6,725 hp in municipal power plant, La Junta, Colorado. Ross oil cooler (inset) included in engine lubricating system.

## That's why *Ross* Exchangers Are Used

**They can be producing the power for a portland cement plant with 1,500,000 annual barrel capacity, or for one of the world's largest rural power co-ops serving 55,000 farm homes in 27 counties. In *any* instance, Fairbanks-Morse Diesels go on indefinitely . . . dependably, profitably and with minimum maintenance.**

**But in order for a Company like Fairbanks-Morse to make such claims for its engines, it has to be mighty confident of its major accessories, too. And Fairbanks-Morse *is* . . . makes a selling point of them by listing the famous makes selected in its bulletins and news releases. Continually, you'll find Ross Exchangers among them — for the lube oil, the jacket water, the fuel oil — whatever heat exchange job is to be done. And the reasons? The same as those of other major Diesel builders: Ross standardization and mass production — a system that cuts engineering and fabricating time and costs; Ross heat transfer efficiency that assures long, continuous service.**

**For Diesel builder or user, for large or small hp ratings, Ross literature is available with helpful information — Ross engineers are available for consultation. Write.**

**ROSS HEATER & MFG. CO., INC.**
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ROSS

## Standardized EXCHANGERS

*Serving home and industry*

AMERICAN STANDARD • AMERICAN BLOWER • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILERS • ROSS HEATER • TONAWANDA IRON

# Only with B. F. Goodrich grommet belts can you make these savings!

## *Save 3 ways! Investigate today! Write or mail coupon*

You save belt costs because belts last longer, save production costs because machines keep running with fewer interruptions, save maintenance costs because they need less attention.

Patented grommet belts by B. F. Goodrich represent the only basic change since invention of the V belt. Belts last 20 to 50 per cent longer, depending on service. (The more severe the service, the greater the increase over ordinary belts.) Grommet belts have more rubber; they're more flexible, give better grip, less slip.

### *What is a grommet?*

A grommet is like a giant cable except that it's *endless*—a cord loop built up by winding heavy cord on itself. There is no overlapping cord *section* as in all ordinary belts. Most belt failures occur in these sections where cords overlap!

### *All cords put to work*

Each of the two grommets and every part of a grommet carry their share of the load. In ordinary belts under high tension the center cords "dish" because tension is greater near the driving faces. Dished cords are doing less work, not pulling their share. Grommet belts have no center cords, there is no dishing—therefore much more strength in proportion to cord volume—and less stretch. Grommet belts stretch, on an average, only about one-third as much as ordinary belts.

### *Better grip, less slip*

Grommet belts have more rubber in relation to belt size. Without any stiff overlap, they're more flexible, grip pulleys better. Size for size, grommet belts give ⅓ more gripping power, pull heavier loads with a higher safety factor. Because there is less slip, there is also less surface wear.

### *Send for proof*

Send the coupon for a set of reports telling users' experiences and showing actual installations where grommet belts outlasted all others. Some typical cases:

"... within a few days ordinary belts had stretched ... After six months of 24-hour-a-day service BFG grommet belts haven't stretched at all ..."

"Ordinary belts lasted only 5 or 6 weeks ... B. F. Goodrich grommet belts are in their sixth month of service ..."

"Previous belts suffered from shock loads, wore out fast ... BFG grommet belts have been in service 2 years with no shut-downs..."

There are hundreds of cases like these.

### *They cost no more*

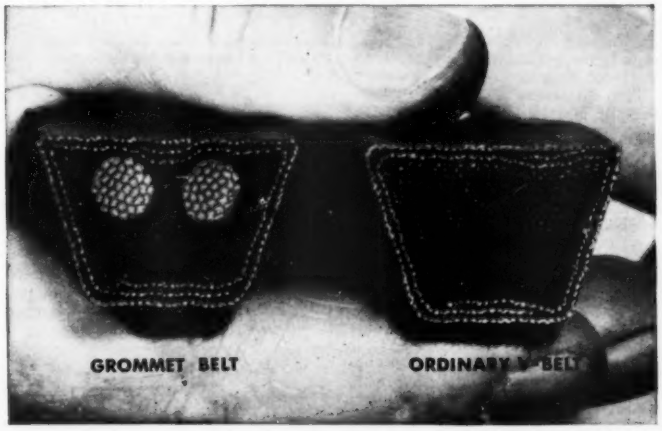
BFG grommet belts cost not one cent more than others. The savings they make for you are clear profit. They are made in C, D and E sections. They are patented by B. F. Goodrich. No other V belt is a grommet belt (U. S. Patent No. 2,233,294).

Write, send the coupon or see your B. F. Goodrich distributor. (He will show you his "X-ray" belt that shows the grommet construction clearly.)

*Grommet Belts* BY

**B.F.Goodrich**

FIRST IN RUBBER




**The B. F. Goodrich Company**
**Dept. OJ-7**
**Akron, Ohio**

☐ Send set of reports telling users' experiences and showing actual installations proving that B. F. Goodrich grommet belts outlast all others.

☐ Have distributor show me the "X-ray" belt that shows how B. F. Goodrich grommet belts are made.

Name_____

Firm Name_____

_____

Street Address_____

City_____

State_____

# Here's the New "Oilwell" 133-B Portable Derrick

## *Taller, More Rigid, Greater Capacity*

THIS new 133-foot portable derrick has many new and improved features over the field-proven 128-B series, such as: (1) increased height, (2) greater load capacity, (3) lower line pull in raising, (4) increased width of substructure, (5) adjustments on all four legs, (6) easier and faster means of assembly as well as (7) a variety of accessories which make it readily adaptable to various makes of draw works and drives.

The derrick is of welded tubular construction which, pound for pound, gives greater compression strength and rigidity than any other type of construction.

**Pipe racking capacity** with full-hole tool joints is—

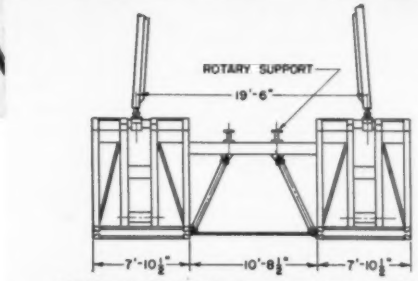
| | |
|---|---|
| 12,200 ft. | $3\frac{1}{2}$" pipe |
| 11,700 ft. | $4\frac{1}{2}$" pipe |
| 10,980 ft. | 5" pipe |

**Reduced raising load**—An improved stringing method for the raising lines utilizes the increased block travel to reduce line pull in raising this taller derrick.

**Fast, easy assembly**—The derrick is completely assembled at ground level and does not require lifting to the floor level. In fact, only one light gin-pole truck is needed in assembling the sections.

**Greater safety in raising**—During the raising operation, the center of gravity never passes over the pivot point as the pivot point is shifted from front to rear legs at approximately 23° from vertical. This eliminates the need to snub the derrick into the final position.

**Other advantages**—(1) Sealed tubular seamless steel construction, (2) easy-to-handle sections joined by tight-fitting, dowel-pin flanges, (3) six-sheave, center-pin crown block which distributes weight evenly to all four legs, (4) adjustment facilities for aligning center line of block with center line of well, (5) adjustable pipe rack with positive locking safety fingers, (6) gin poles which form draw works and engine-drive cover frame, (7) fast line from draw works running inside the derrick with traveling block in view at all times and (8) deadline held down by special anchor.




**LARGER FLOOR SPACE—floor space between legs, 19' 6" x 14' 0½". Window opening front side, 98' 7".**

***Ask . . . your nearest "Oilwell" Representative for complete information on the 133-B Portable Derrick.***

**OIL WELL SUPPLY COMPANY**

Branches Serving All Oil Fields

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Export Division Office—
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USS "OILWELL" TRADE MARK

UNITED STATES STEEL

# Lon Minier's year is 469 days long!

With his Beechcraft Bonanza, Mr. Minier figures he does *seven* days' productive work in *five* days' time. And he has week ends free! That's two extra days per week. In terms of work done, his year "lasts" far longer.

Mr. Minier is Regional Manager of Gamble-Skogmo, Inc., distributors of auto and radio supplies, and hardware. His territory sprawls over six western states. "I travel thousands of miles monthly with no fatigue," he says. "That's as important to me as time saved."

## Here's proof the C35 Bonanza is your best buy:

**What a performer!** Greater take-off h.p. rating, plus all-metal continuously variable pitch Beech propeller insures excellent short-field performance. Rate of climb 1,110 fpm, full gross weight. Range increased to 1,180 miles with 20-gallon auxiliary tank.

**Economy leader.** 175-mph cruising speed, using only 65% available power. This saves engine "wear and tear," and gives you an extra safety margin. At cruising, Bonanza uses only 9½ gallons per hour—an unsurpassed engineering achievement.

**Safety extra:** New Beechcraft Hi-Strength safety harness now standard. Exceeds CAA requirements, allows free movement. Extra comfort, less bulk. *More* comfort: Aerodynamic improvements to stabilizer provide easier ride. Roomy *soundproofed* cabin.

Get the *whole* Model C35 story from your Beechcraft distributor. Or write today to Beech Aircraft Corporation, Wichita, Kansas, U.S.A.

Top speed, 190 mph
Cruising speed, 175 mph
Range, 775 miles
Fuel economy, 19.9 mpg

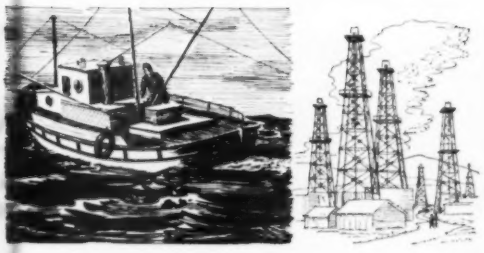
Beechcraft

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

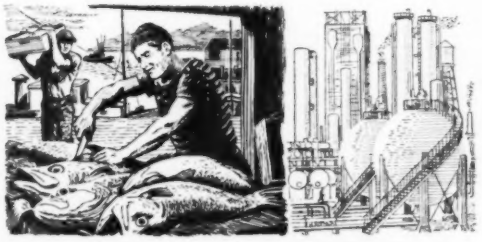
# "What's this 'integration' they're attacking you for?"

**One of the complaints** *now made about big companies like Standard Oil Company of California is that they practice "integration". This word is made to sound so evil that you may wonder what it means as it's used in this case.*

**The fact is that integration is common** in American businesses both large and small. They use it as a natural part of their system of increasing efficiency, cutting costs and improving products. Integration doesn't make a *good* company *bad*. To understand integration at a glance, look at this parallel:

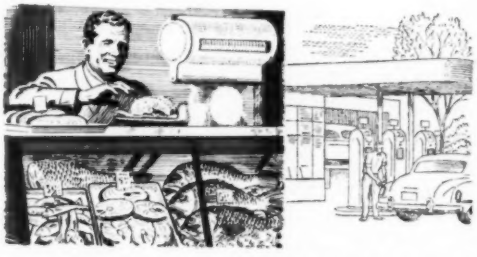


**A fisherman takes his boat** onto the ocean and makes his catch. Standard discovers oil and brings it up out of the ground. If both then *sell*—the fisherman to a buyer at wharfside, and Standard to some buyer at the well—there's no integration. But suppose each takes the next step . . .



**When the fisherman cleans his own fish,** he has become an integrated business. So, too, Standard. Like him, we work to put the product into the form you want. We refine the crude oil we ourselves produce—turn it into gasoline, lubricants, chemicals, and all the rest. This is integration.

**If the fisherman now carries** his cleaned catch to the market-place, he is further integrated, for he is now also in the transportation business . . . as is Standard when we operate our own pipelines and tankers to carry oil from well to refinery, or refined products to areas where they'll be used.



**And if the fisherman then sells his product** through a store of his own, he completes his integration. Standard does it, too, through Company-owned stations (about 1 in 7 stations where Chevron gasolines are sold). Integration helps us do better for you and the nation, and so for ourselves.

*I'd Like to Know . . .* Many people write to Standard asking pertinent questions about the Company. We answer all letters individually, but some points seem of general interest. We take this way of discussing them for every one. If you have a question, we urge you to write in care of: "I'd Like to Know," 225 Bush Street, San Francisco 20, California.

## STANDARD OIL COMPANY OF CALIFORNIA

**• plans ahead to serve you better**

# piping upkeep *costs more* now!

Crane Alloy Cast Iron Gate Valve, 18-8 Mo. trimmed. 200 Pounds W.O.G.

**You'll spend less for it with Dependable Quality**

## CRANE VALVES

*. . . That's why more Crane Valves are used than any other make*

**High Corrosion Resistance at Low Cost**

Crane No. 14477 Alloy Cast Iron Gates give excellent service where "all-iron" or "brass trimmed" valves fail, due to corrosion of seating surfaces. Body rings, stem, and disc-faces are Crane 18-8 Mo. Conditions permitting, these valves, with low nickel alloy cast iron body, are ideal substitutes for hard-to-get, more expensive, all 18-8 stainless steel valves.

O.S. & Y. design keeps stem threads from contact with line fluid; straight through ports assure unrestricted flow, minimize turbulence and corrosive action. Extra-long guides keep disc travel true.

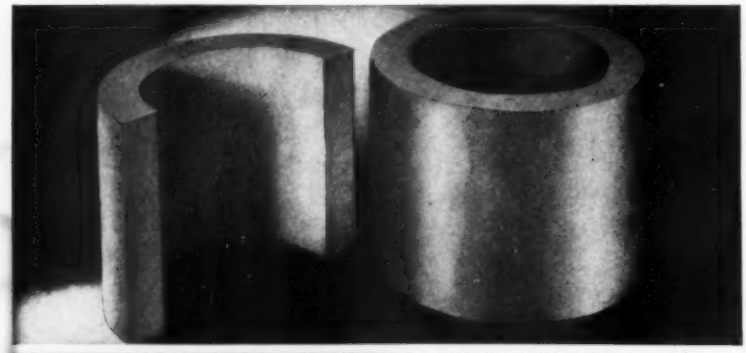
**Your Crane Representative will gladly show you why Crane Valves give better performance at lower ultimate cost—why you should insist on Crane Quality.**

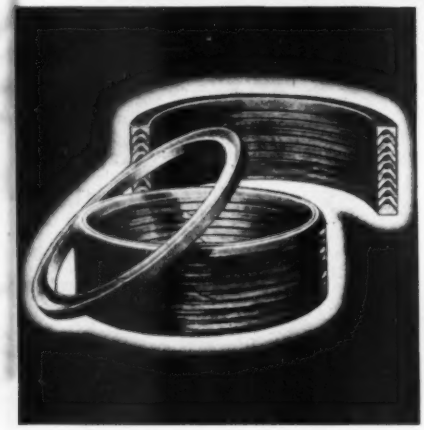
# CRANE CO.

*General Offices:*
836 S. Michigan Ave., Chicago 5, Ill.
*Branches and Wholesalers Serving All Industrial Areas*

**VALVES • FITTINGS • PIPE • PLUMBING • HEATING**

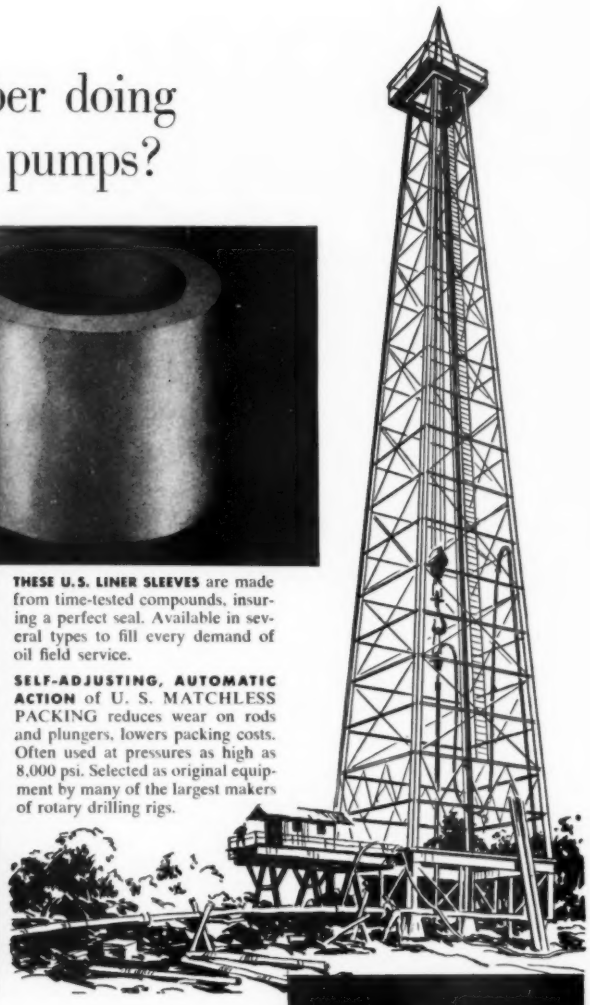
# What's U. S. Rubber doing in rotary drilling pumps?



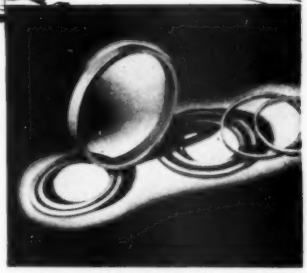


**THESE U. S. LINER SLEEVES** are made from time-tested compounds, insuring a perfect seal. Available in several types to fill every demand of oil field service.

**SELF-ADJUSTING, AUTOMATIC ACTION** of U. S. MATCHLESS PACKING reduces wear on rods and plungers, lowers packing costs. Often used at pressures as high as 8,000 psi. Selected as original equipment by many of the largest makers of rotary drilling rigs.



"U. S." oil field specialists are constantly working on new ways, new products to speed up drilling, reduce costs. The line of U. S. Packings, for example, represents in design, materials and workmanship what is *right* from the engineering standpoint. Each type is packaged for easy handling and for quick identification for application. A complete range of sizes and sets are furnished for the leading makes of mud pumps.



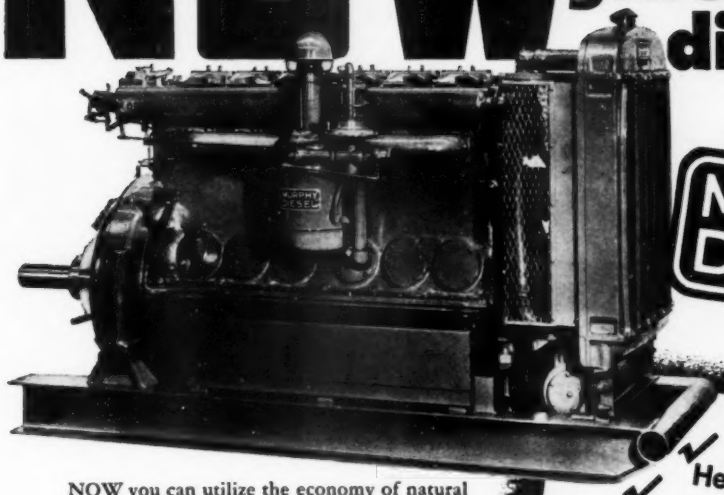
**U.S. WATER CYLINDER AND POT COVER GASKETS** are made from a combination of high quality duck and rubber friction to prevent leaks and blowouts. Lathe cut or cut from slab stock.

PRODUCTS OF U.S.RUBBER SERVING THROUGH SCIENCE

**UNITED STATES RUBBER COMPANY**

MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

# NOW a Dual-Fuel Engine that's different



MURPHY DIESEL

- Heavy duty design
- Economy of operation
- Long Engine life
- Instant fuel changeover
- Ease of operation
- Full power on either fuel without additional parts

NOW you can utilize the economy of natural gas as fuel in a rugged, heavy duty engine that's built to give long, dependable service. Unlike ordinary gas engines or gas conversion engines, the Murphy combines heavy duty construction with high compression combustion to provide new highs in durability and economy of operation.

In operation, the engine is started and warmed on diesel fuel. Its operation on either diesel fuel or natural gas is instantly selective by properly positioning a simple hand lever for the desired fuel. On either fuel no further adjustments are necessary. If operation as a full diesel is desired for continuous diesel service, the change can be made quickly without any additional parts.

Get full details from your Murphy Diesel Dealer and ask for the bulletin described at the right.

*Bulletin 107 gives design and operating details of Murphy Dual-Fuel Engines. Ask for your copy today*

**MURPHY DIESEL COMPANY**
**5305 W. Burnham St., Milwaukee 14, Wisconsin**
*Manufacturers of Dual-Fuel Engines, 135 to 180 H.P.; Diesel Engines, 90 to 226 H.P.; Generator Sets, 60 to 140 K.W.; also Crude Oil Engines and Mech-Elec Units.*

***See Your Nearest Murphy Diesel Dealer for Complete Information:***

**OIL INDUSTRY FACTORY BRANCH**
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**AMARILLO, TEXAS**
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**GREAT BEND, KANSAS**
Manufacturers Dist. Co.

**EDMONTON, ALBERTA, CANADA**
Northern Engine & Equip. Co., Ltd.

**DALLAS, TEXAS**
Conley-Lott-Nichols Mach. Co.

**HOUSTON, TEXAS**
Houston Engine & Pump Co., Inc.

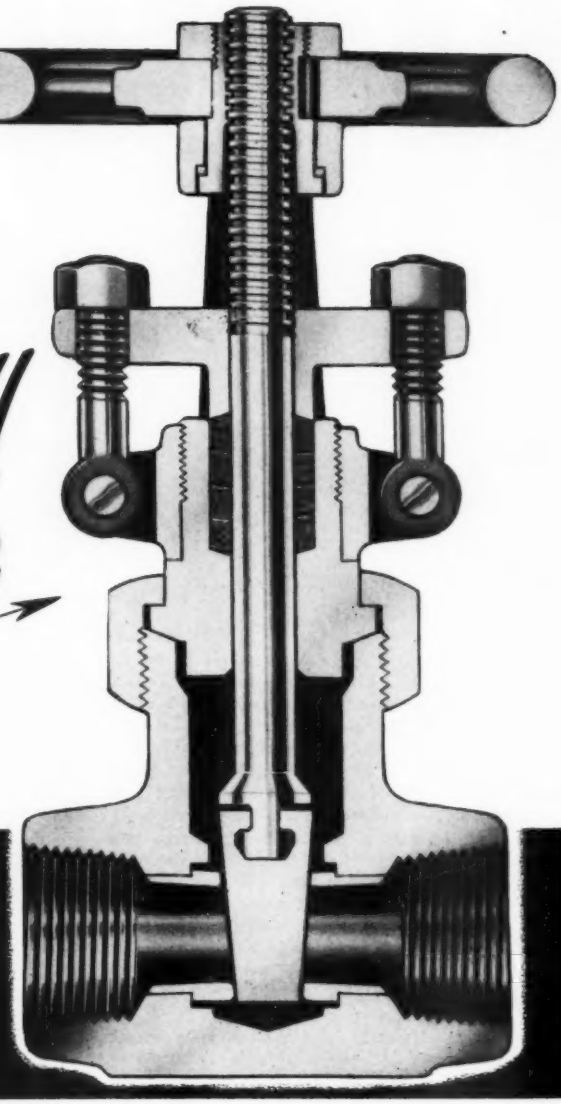
**ODESSA, TEXAS**
Electric Service & Supply Co.

**JACKSON, MICHIGAN**
Utility & Industrial Supply

You can

# Repack Under Full Pressure

with a



## Chapman List 960

No pressure is transmitted to the stuffing box of a Chapman List 960 when the valve is in the open position . . . you can always repack it easily, fast, without stopping the flow through the valve. What's more, it's a tougher — more rugged — valve that reduces many other maintenance problems.

Take for instance, the wedge faces — they're hardened to 800 Brinell by the exclusive Malcomizing process to give peak wear resistance. Seat rings, too, have unusual wear-resisting and non-galling characteristics. And, in addition, recent design changes have resulted in stem and wedge gate connections 50% stronger than before.

Write *today* for detailed technical information. The Chapman List 960 is available in sizes from ¼" to 2", either metal to metal or gasketed joint. Rising stem with yoke (as illustrated) or rising stem inside screw type. For pressure range 2000 lbs. at 100 deg. F., 380 lbs. at 1000 deg. F. For higher pressures specify List 990.

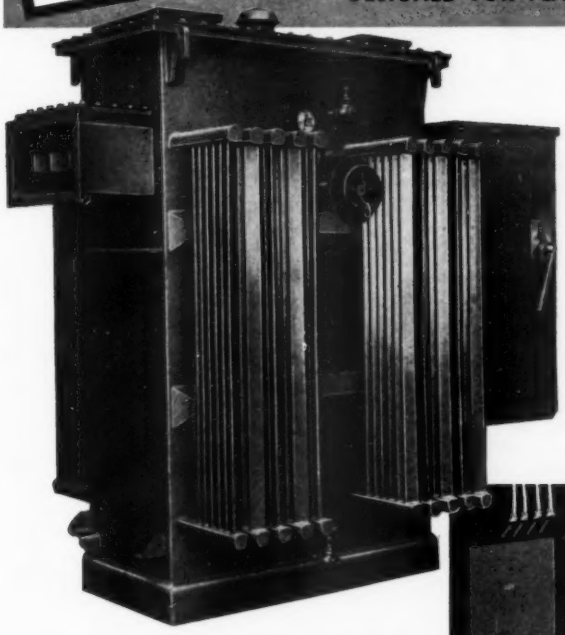
**The Chapman Valve Manufacturing Company**

INDIAN ORCHARD, MASSACHUSETTS

Wagner®
TRANSFORMERS
. . . the choice of leaders in industry

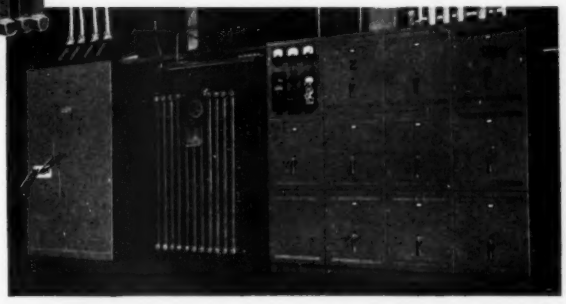
# Wagner
# UNIT SUBSTATION TRANSFORMERS

**DESIGNED FOR PLANT POWER DISTRIBUTION SYSTEMS**

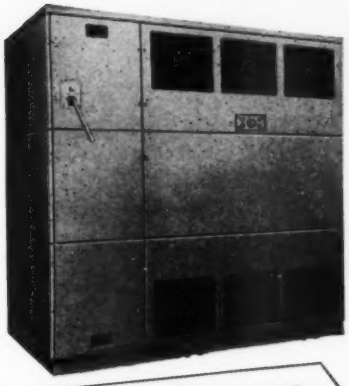


The ever-increasing demand for electric energy to power today's stepped-up production presents a critical problem. The answer to this problem has been found in load-center power distribution systems. The vital part of the load-center system is the transformer. If a switch or circuit breaker fails, only a part of the system is affected—but if the transformer fails, the entire system is dead.

Wagner Unit Substation Transformers assure a continuous, dependable flow of power. They are carefully designed to meet your distribution requirements, and are available with various types of entrances and controls for the high-voltage circuits, and with proper throats on the secondary side to connect to any make of switchgear, in the usual range of ratings up to 2000 kva.



*Wagner-equipped unit substation in a synthetic textile plant.*



## Dry-Type Indoor Transformers

Wagner now furnishes three-phase dry-type transformers in ratings up to 2000 kva in the 15 kv class and below. These units are compactly housed in neat, attractive enclosures, which can be arranged to include primary and secondary switchgear compartments to form readily accessible, closely-coupled unit substations. Relatively light in weight, so that they can be used in multi-story buildings, they are readily adaptable to any installation requirement.

**WAGNER ELECTRIC CORPORATION**
**6389 Plymouth Ave., St. Louis 14, Mo., U.S.A.**

Wagner Electric Corporation
1891 WE 1951

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

**BRANCHES IN 31 PRINCIPAL CITIES**

TM-4

# Pick The Make That Lets YOU Pick

## exactly the design you need

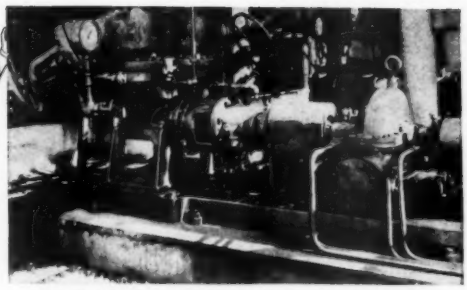
Worthington has a centrifugal pump for practically any conceivable refinery requirement—in the most complete range of sizes.

The pictures here show only a few of the many purposes served by Worthington Centrifugals. Whether your problem is high temperatures . . . volatile liquids . . . abrasives . . . acids . . . or any of the host of others that harass refineries — the Worthington line includes the one best pump for the job.

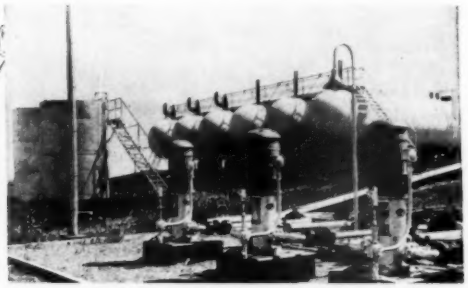
Further assurance you enjoy when you standardize on Worthington: you know that Worthington, making the broadest line of pumps, will recommend the best type for each job—you know you'll benefit from *engineering* that's the finest in the business—and you know you can depend on *service* that does its best to keep you in peak production.

Write us for bulletins on the types in which you're interested and see why *there's more worth in Worthington.* Worthington Pump and Machinery Corporation, Centrifugal Pump Division, Harrison, N. J.

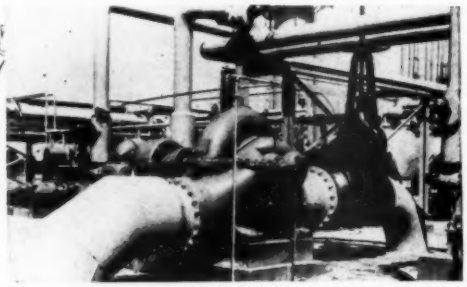
SEE OUR CATALOG IN SWEET'S



**WORTHINGTON HR CENTRIFUGAL,** shown at Sun Oil Co., Marcus Hook, Pa., is typical of pumps used in distillation, cracking and treating petroleum products.



**WORTHINGTON QER VERTICAL** centrifugal process pump, shown at Magnolia Petroleum Company, Chitwood, Oklahoma, is used to transfer propane, butane and LPG.

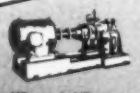


**WORTHINGTON LA CENTRIFUGAL,** turbine-driven, shown at Carthage Corporation plant, Carthage, Texas, is typical of cooling tower and general service pumps.

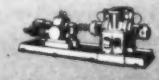
THE WORLD'S BROADEST LINE ASSURES YOU THE RIGHT PUMP FOR EVERY JOB

# WORTHINGTON

C.1.4



**Types HR and HB** Capacities to 1600 gpm. Heads to 900 ft. Temperatures from far below zero to 800 F. Pressures from high vacuum to 750 lb. gauge.



**Type HD** Hydraulically-balanced, double-suction impeller handles boiling liquids with low submergence. 600 to 3200 gpm. Heads to 700 ft, temperatures to 850 F, pressures to 550 lb.

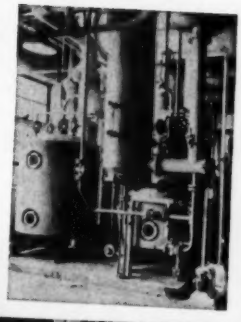
**Type CNE** For loading or transfer service. Capacities to 1500 gpm. Heads to 500 ft.

**Type HM** Available in 12 sizes. Capacities to 700 gpm. Heads to 450 ft. Maximum temperatures 500 F.

# Improve Plant Performance

## ...REDUCE INSULATING COSTS

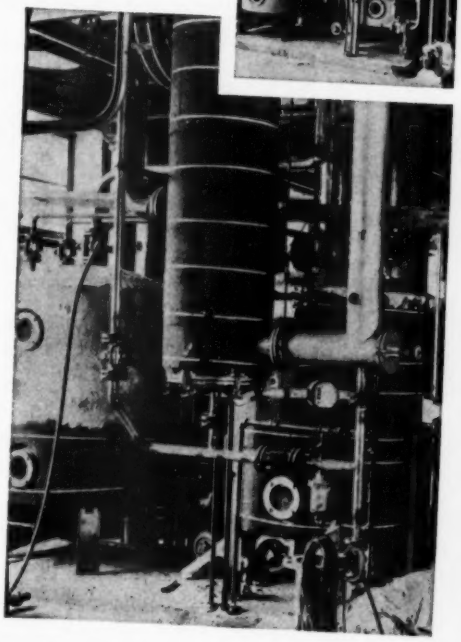
**When you improve temperature control you can run your plant more efficiently. With PC Foamglas you can control temperatures more exactly, more economically.**



**Here's why:** Since it consists of still air sealed in minute glass cells, Foamglas is an excellent barrier to heat transfer. Glass has unusually high resistance to many elements that cause insulation to deteriorate. Consequently, long lasting, trouble free service, makes Foamglas the least expensive insulating material.

PC Foamglas is available in standard flat blocks, curved segments and beveled lags, to fit equipment sides, heads and domes, and in preformed sections for standard size pipe and fittings.

We invite you to send in the coupon for a sample of PC Foamglas, and for free literature containing complete information.



This typical equipment, used in a process where temperatures range from 0°F. to 200°F., is insulated with curved segments of PC Foamglas. Insulation Contractor: Combustion Equipment & Insulation Company, Cleveland, Ohio.

**PITTSBURGH CORNING CORPORATION, PITTSBURGH 22, PA.**

The **best** glass insulation is cellular glass. The **only** cellular glass insulation is PC Foamglas. This unique material is composed of still air, sealed in minute glass cells. It is light-weight, incombustible, verminproof. It has unusually high resistance to moisture, chemicals and many other elements that cause insulation to deteriorate.

Pittsburgh Corning Corporation
Dept. DD-71,307 Fourth Avenue
Pittsburgh 22, Pa.

Please send me without obligation a sample of Foamglas and your FREE booklet on the use of PC Foamglas for Industrial Insulation.

Name .....

Address .....

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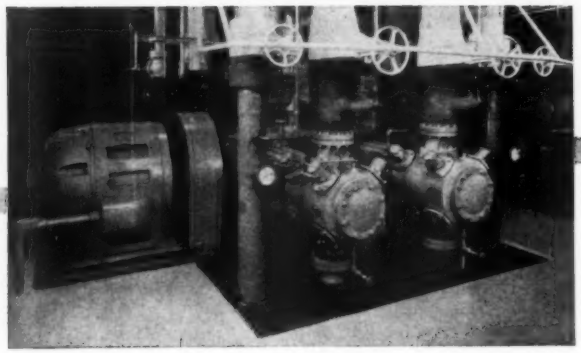
PITTSBURGH ® PC CORNING

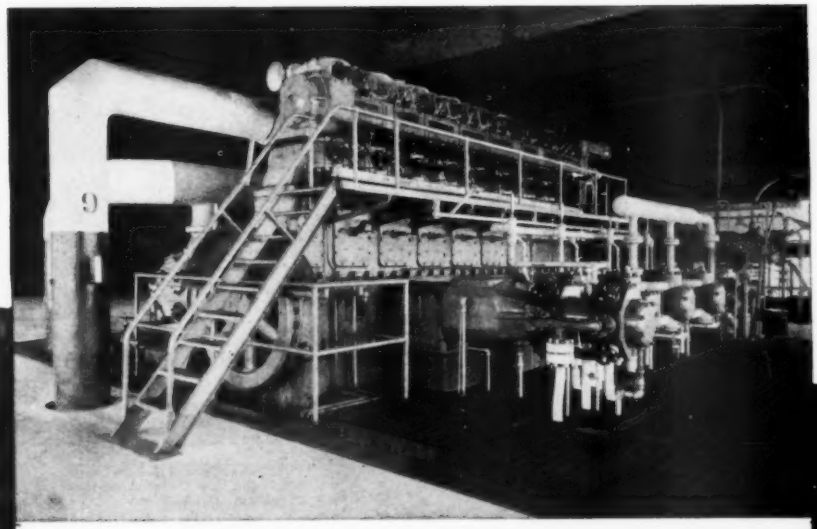
**FOAMGLAS cellular glass INSULATION**

*... when you insulate with FOAMGLAS... the insulation lasts!*

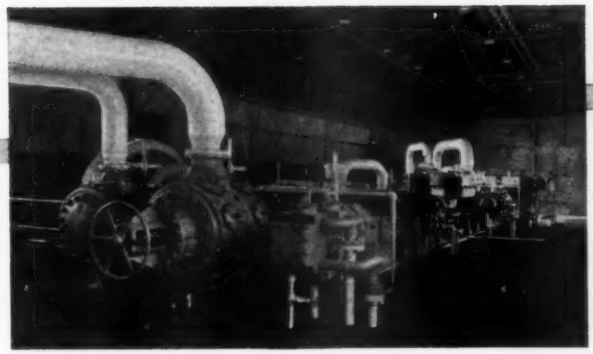


Clark CMA-4, 300 bhp, 600 rpm, balanced/opposed motor-driven compressor, performing two compression services at Spencer Chemical Co. dry ice plant: Two cylinders in main or liquefaction service compress carbon dioxide through two stages from a suction pressure of 20 psig to a discharge pressure of 345 psig, and two cylinders in recycle service compress carbon dioxide two-stage from 0 psig to 345 psig discharge pressure.

# 5 types of compressors at Spencer Chemical, signify .



One of nine Clark SCRA, 2750 bhp, steam-engine-driven compressors, handling feed gas for ammonia manufacture at Spencer Chemical Co. Compression through six stages is from atmosphere to 5500 psig discharge pressure.



Two Clark CRA-6, 1750 bhp, 327 rpm, balanced/opposed motor-driven compressors, compressing hydrogen and carbon monoxide feed gas from atmospheric pressure to a discharge pressure of 5150 psig at Spencer Chemical Co. End product: Methanol.

# Clark Versatility!

It may be said that the list of compressors in service at the Jayhawk Works of Spencer Chemical Company reads like a Clark catalog. For there are sixteen Clark compressors, representing five basic models, shouldering the main compressor requirements of this Pittsburg, Kansas plant.

But the significant aspect of these Spencer installations is not the *number* of Clark units involved, rather the *versatility* of the Clark line that enables complete fulfillment of any and all requirements—no matter how diversified!

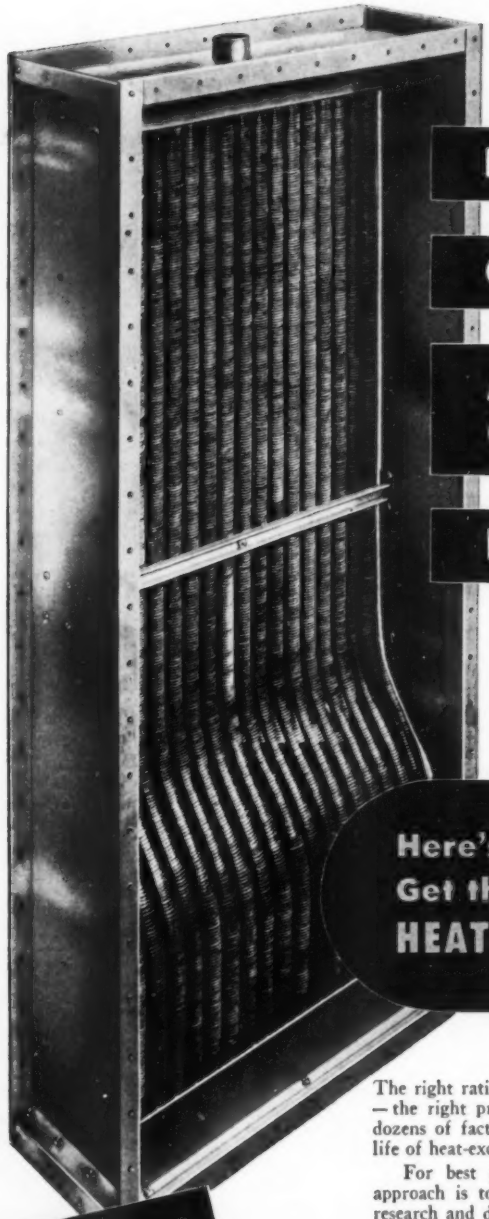
In this one plant, for example, are two Clark CRA-6, balanced/opposed motor-driven compressors; a Clark CMA-4, balanced/opposed motor-driven unit; and nine Clark SCRA, steam-engine-driven models (all illustrated and described herewith); as well as three Clark MA-4 and one Clark RAS-6, gas-engine-driven compressors (not shown).

All of which means simply this: No matter how difficult the problem . . . how specialized the function . . . how diversified the conditions . . . compressor requirements are met completely and most competently by Clark. For, by reason of the versatility of its line, Clark is in the favorable position of being able to recommend without bias and build to anyone's best interests and preferences.

Your nearest Clark representative has data and literature to support these claims.

CLARK®

COMPRESSORS



**Heating?**

**Cooling?**

**Air Conditioning?**

**Process?**

**Here's How to Get the RIGHT Answer to your HEAT-EXCHANGE PROBLEMS**

The right ratio of surfaces – the right materials – the right velocities – the right proportion between coil area and depth . . . there are dozens of factors that affect the efficiency, maintenance and service life of heat-exchange coils.

For best performance in your own application, the practical approach is to take full advantage of the unequalled engineering, research and design skill – the unequalled manufacturing and testing facilities – which Aerofin offers you.

To get the *right* answer – ask the Aerofin man.

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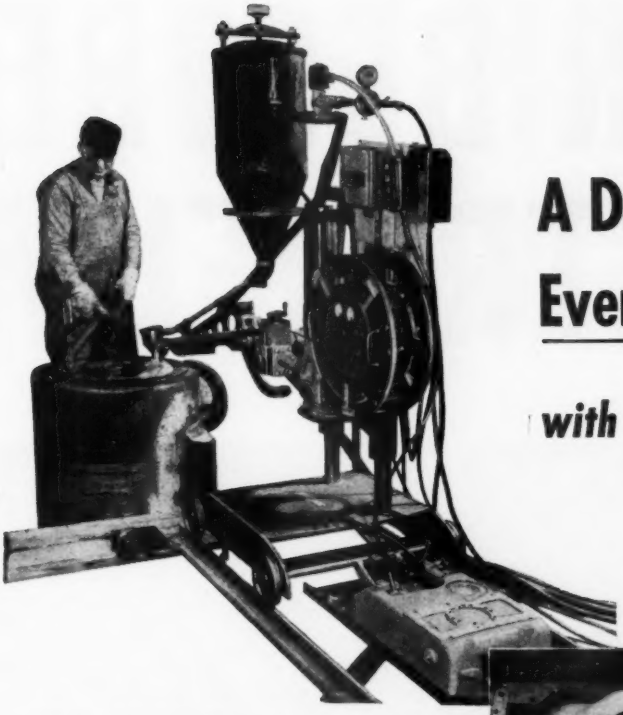
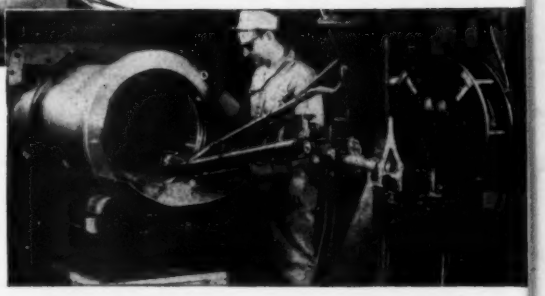


# A Day's Output Every Hour

## with UNIONMELT Welding

Trade-Mark



(*Above*) UNIONMELT welding a chromium alloy end ring to a mild steel pump shell takes only 1 hour and 23 minutes. Former methods of welding took 10 hours. Ring and shell, each 4 in. thick, are joined in consecutive passes as the work rotates under the UNIONMELT welding head.

(*Right*) This UNIONMELT welding machine smoothly deposits a sound, corrosion-resistant overlay inside a mild steel pump shell. Stainless steel metal — 20 to 120 lb. of it, depending on pump size — builds up at 20 lb. per hour. Highest former rate was 2 lb. per hour.

In making high-pressure steam pumps, these two welding operations used to take 20 hours—2½ working days. This was cut to 2½ hours by UNIONMELT welding as shown above. In addition, finishing costs dropped sharply because the UNIONMELT deposits are smoother and need less machining.

High-speed production is common wherever automatic UNIONMELT welding is used to join ferrous or non-ferrous metals. Welds up to 3 in. thick can be made in one pass; light-gage sheet can be welded at speeds up to 200 in. per minute.

UNIONMELT welding is only one of many time- and moneysaving LINDE methods for making, cutting, joining, treating, and forming metals. So, whatever you do with metals, there is a good chance that LINDE know-how, show-how, and equipment can help you do it better, more quickly, or at lower cost. Telephone or write to our nearest office today. LINDE AIR PRODUCTS COMPANY, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. Offices in Other Principal Cities. In Canada: Dominion Oxygen Company, Limited, Toronto.

*Unionmelt*

Trade-Mark

**EQUIPMENT AND SUPPLIES**
**for fast, automatic electric welding.**
**No sparks, spatter, smoke, or flash.**

The terms "Linde" and "Unionmelt" are registered trade-marks of Union Carbide and Carbon Corporation.

# NEVER BEFORE OF PETROLEUM

# IN THE HISTORY REFINING—

## YES, CITIES SERVICE MAKES PROCESSING HISTORY...OPERATES A CATALYTIC CRACKER... A KELLOGG FLUID UNIT...CONTINUOUSLY FOR MORE THAN 2 YEARS ON ITS INITIAL RUN!

When Cities Service engineers finally closed off the oil feed valve on June 4 at East Chicago, a major new processing record had been made!

THE NEW RECORD: 785 days of continuous operation from the time the cracker was first started up on April 9, 1949 . . . *785 days on its initial run.*

In that period of time, using carefully worked out operating techniques, Cities Service East Chicago personnel processed into high test gasoline with this one Kellogg unit almost *twelve million barrels* of virgin gas oil.

This cracker is one of the five units designed for Cities Service by Kellogg. The fifth unit is in the last stages of construction at Ponca City, Oklahoma.

All told, Kellogg has designed and erected 49 Fluid catalytic crackers with a total annual capacity of nearly 300 million barrels for refiners in Canada, England, Latin America and the United States.

## *THE* M. W. KELLOGG COMPANY

SUBSIDIARY OF PULLMAN INCORPORATED

**FOR FIFTY YEARS AN INTEGRAL PART OF PROCESSING HISTORY**

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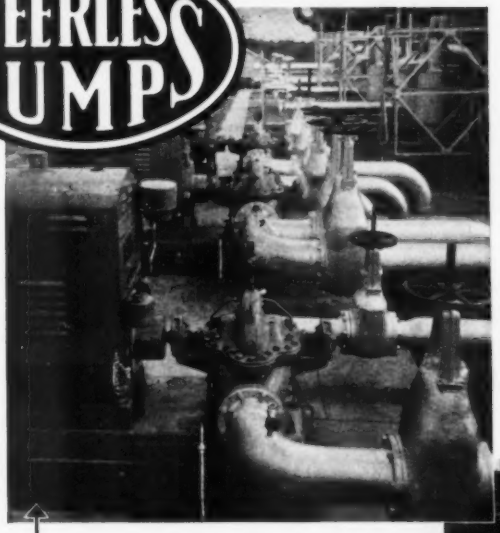
# PEERLESS builds dependable pumps...

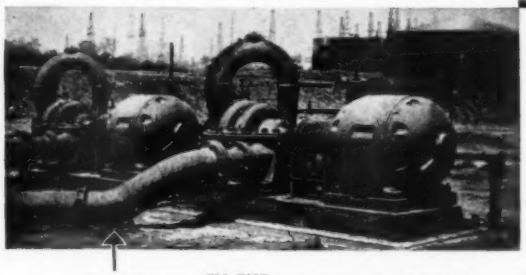
PEERLESS PUMPS

HERE ARE THREE HIGHLY EFFICIENT WATER HANDLING PUMPS COMBINING SUPERIOR DESIGN, QUALITY CONSTRUCTION & EXCELLENT PERFORMANCE



**PEERLESS TYPE A** *high quality* **GENERAL PURPOSE PUMPS FOR WATER SUPPLY AND BOOSTER SERVICE.** Horizontal split case, single stage design with double suction impellers and ball bearing construction. For water and clear alkaline fluids. Available in sizes from 1¼" to 48" discharge. Capacities up to 70,000 gpm. Heads: up to 300 feet. All types of drive. Rugged in construction; many outstanding design features, high efficiency ratings over entire range of sizes. Bulletin B-1300 describes Peerless Type A pumps in detail.

**PEERLESS TYPE PE-PB** *economical* **GENERAL PURPOSE PUMPS** — One of the broadest lines of end-suction, single stage, horizontal pumps for most all water handling services offered by any manufacturer. Both fractional and integral hp, direct connected electric (Type PE) or belted (Type PB) models available. H.P. range: ¼ to 150 hp. Capacities: 10 to 5500 gpm. Heads: to 260 feet. Excellent hydraulic characteristics. Bulletin B-2300 describes the Peerless Type PE and PB pumps in detail.



**PEERLESS TYPE TU-TUT** *multi-stage* **GENERAL AND SPECIAL PURPOSE PUMPS.** For application to both process water pumping, boiler feed water service and some process liquids against higher heads than single stage pumps; two stage (Type TU) and 3, 4 and 5 stage (Type TUT) models are available. Horizontal split case design Type TU has low loop crossover; Type TUT has high loop. Capacities: 50 to 3500 gpm. Heads: up to 1600 ft. All types of drive available. Bulletins No. 301 and No. 310 describing both types are available.

***WRITE FOR BULLETINS...*** Upon request, Peerless will send individual bulletins on most every pump, both horizontal and vertical, in its complete line of water handling pumps. Write today for information on the type you require.

**PEERLESS PUMP DIVISION**
**FOOD MACHINERY AND CHEMICAL CORPORATION**

*Address inquiries to Factories at:*
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Offices: New York, Chicago, St. Louis, Atlanta; Dallas, Plainview and Lubbock, Texas; Fresno, Los Angeles; Phoenix; Albuquerque, New Mexico.

PEERLESS PUMP fmc

# TRET·O·LITE

For effective, economical assistance on any production problem involving emulsified crude, down-the-hole corrosion, scale accumulation, oil-in-water emulsions or paraffin difficulties, call on TRET-O-LITE.

***There's a service engineer in or adjacent to every producing field.***

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*Chemicals for the Petroleum Industry*

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Now—more than ever

**M=PT**

Morse means Power Transmission

# Sensational, new does the oil field job

Close-up of the Morse HY-VO Drives used for transmitting power for the 1500-H.P., 600-R.P.M. Diesel-electric drawworks. Drives are 2" pitch, 12" wide.

# Morse HY-VO (TRADE — MARK) Drive that "couldn't be done"!

## PROVIDES MEANS FOR TRANSMITTING POWER TO DRILL 20,000-FOOT HOLES . . . MAKING POSSIBLE 1500-H. P., 600-R. P. M. PORTABLE DIESEL-ELECTRIC DRAWWORKS

Experienced engineers said it "couldn't be done" with conventional chain drives.

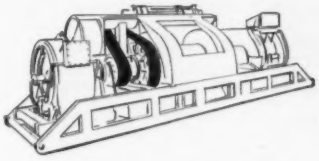
It couldn't be done, but the sensational, new Morse HY-VO Drives took the job in stride . . . an assignment requiring drives which would operate *twice as fast* with *three times the load* considered practical by manufacturers for conventional chain drives. And, the job was done with 2"-pitch, 12"-wide HY-VO Drives, allowing the unit to be *portable!*

**Revolutionizes power transmission**

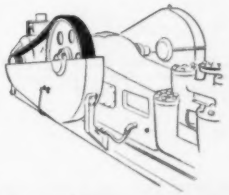
Entirely new design principles are used in the HY-VO Drive. Vibration and destructive linear pulsations are virtually eliminated, allowing the HY-VO Drive to operate at tremendously increased rotative speeds, using drives of much narrower widths. Cost-per-hour can be cut by as much as 50 per cent; service life is much longer.

Due to the shortage of materials and production facilities, orders for HY-VO Drives must carry a priority rating at the present time.

**MORSE CHAIN COMPANY**
**7601 Central Avenue, Dept. 167 • Detroit 8, Michigan**

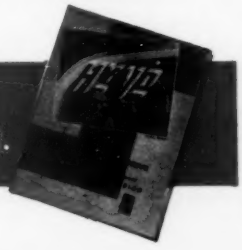


The drawworks, designed and built by EMSCO for Standard Oil Company of California. The rig is the first *portable* unit of its size and power.



The huge mud pumps used in connection with the drawworks are equipped with 1½"-pitch, 8"-wide Morse HY-VO Drives for transmitting 765 H.P. at 1120 R.P.M.

Write today for Catalog No. C-72-51.




**MORSE**
MECHANICAL
*POWER TRANSMISSION*
PRODUCTS

PRODUCTS OF BW BORG-WARNER

# TAKE YOUR PICK

## Either Goggle gives Comfortable Protection Over Personal Glasses

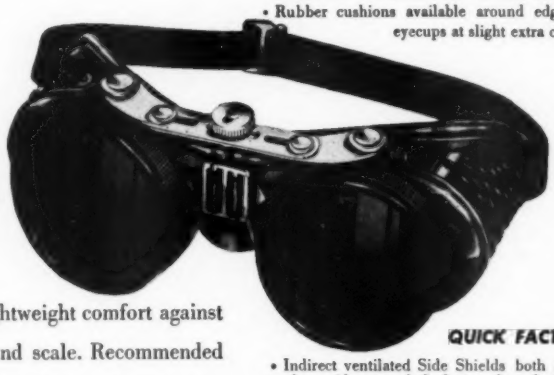
Safety Goggles

FOR CHIPPING and SIMILAR OPERATIONS
AO 321R DURAWELD GOGGLE

Light in weight, these goggles protect workers' eyes and personal glasses against flying particles striking from any direction. They're highly recommended for grinding, babbiting, riveting, hand tool and machine work, rail and rivet cutting and spike driving, as well as chipping.

**QUICK FACTS:**

- Opaque Eyecups have serrations in edge, plus many side perforations for ample ventilation and anti-fogging.
- Retaining rings of aluminum, treated to prevent corrosion and slotted for extra ventilation.
- Rigid adjustable Metal Bridge.
- Lenses are 50 mm. Super Armorplate or 6 Curve Super Armorplate, Clear or Calobar, medium, dark or extra dark.
- Headband of one-piece rubber, easily adjustable.
- Rubber cushions available around edges of eyecups at slight extra charge.



FOR GAS WELDING and SIMILAR OPERATIONS
AO 323R DURAWELD GOGGLE

The 323R offers quality protection with lightweight comfort against injurious light rays, glare, flying sparks and scale. Recommended wherever these hazards are present, as in burning, cutting, brazing and furnace operations, as well as gas welding.

**QUICK FACTS:**

- Indirect ventilated Side Shields both protect and provide natural draft to reduce fogging of lenses.
- Opaque Eyecups fit over practically all personal glasses.
- Noviweld Lenses, shades 3, 4, 5, 6 or 8 or Noviweld-Didymium Lenses, shades 3, 4, 5 or 6. Easily replaceable cover lenses protect filter lenses from pitting or scratching.
- Bridge, Headband, Rubber Cushions similar to AO 321R Goggle.

Your nearest AO Safety Products Representative can supply you

American Optical
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

# They Say—

### Short-Sighted Iran

"Without the protection of the free world, which Iran has already once successfuly invoked in the United Nations, the fate of the nation can easily be imagined. Excited members of the Majlis may shout that if Iran doesn't have her way with Britain she will be driven to the Communists. That is an understatement. If Iranian nationalism cannot respect its own commitments it may well be destroyed by an aggressive neighbor, and the shrift that Soviet imperialism would give to Iranian nationalism would be short indeed."

*Editorial in the New York Times.*

### Time to Start

"In these emergency times national security as well as operating efficiency demand that future unitization of fields not wait until everyone concerned nears exhaustion—often including the fields—before owners agree on a cooperative program.

Elk City demonstrates that the time to start unitization is in the primary development stage. That accomplished, the rest will take care of itself."

*Editorial in the Oil City Derrick.*

### Research Attitude

"The American petroleum industry is committed to competitive research, and considers such research the most valuable for most purposes. About 90 per cent of our research is done competitively in private laboratories.

"The industry does not share the view of those in the Bureau of Mines who assert, with some political support, that the Government should shortly proceed to build or subsidize large-scale 'demonstration plants' at very high costs. Such plants would be obsolete before they were finished, could not possibly compete without a big government subsidy, and would contribute less to the development of the processes than 5 per cent as much money spent on well-planned bench-scale and pilot-plant research and development."

*Dr. Robert E. Wilson, chairman, Standard Oil Co. (Ind.), presenting the third Cadman Memorial Lecture, Institute of Petroleum, London.*

### Nearly Everything Goes

"We are making every effort to keep our furnaces operating at a high rate to obtain maximum ingot production. Normally we purchase scrap in charging box form. This purchase of locomotives for scrap is typical of the lengths to which we are going to obtain all possible scrap in this period of urgent need."

*W. F. Mumford, vice president, American Steel & Wire Co., discussing purchase of 13 coal-burning locomotives for dismantling as scrap.*

### No Subsidy, No Guarantee

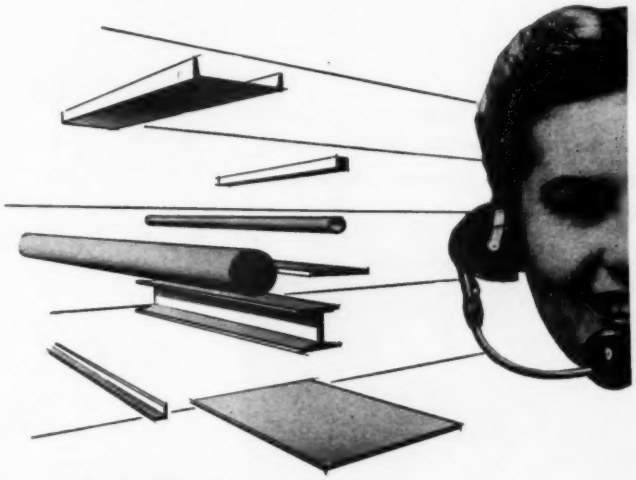
"It (accelerated amortization) is not a subsidy to business, much less a guaranteed profit. The cost to the Government is substantial, yet that cost is not a gift to industry but a reflection of the economic wastefulness of war and military preparations. It may well be less under accelerated amortization than it would be under any other practicable and effective inducement plan.

"It is somewhat surprising that a plan which was used with such conspicuous success during two world wars should have become a subject of controversy during this emergency."

*Editorial in the Guaranty Survey, Guaranty Trust Co. of New York.*

### Odd Tax Approach

"I might point out that among the agencies of the Government which

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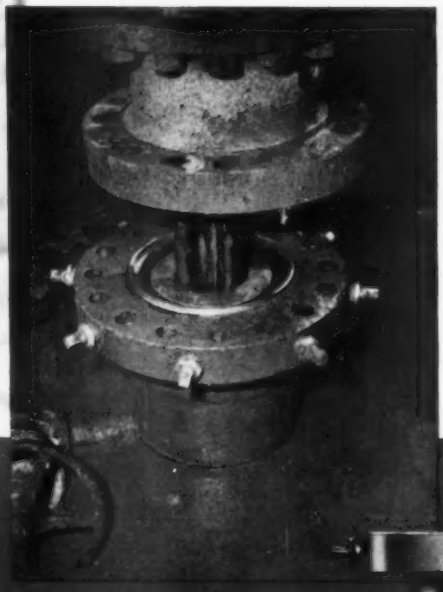
# WHAT COULD BE SAFER?

. . . than the protection of your Mother's arms or closing in around casing before blowout preventers are unflanged.



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do not hold our size against us is the tax collector. My own company set aside more than $100 million for taxes last year, in addition to a similar amount collected for federal and state governments in the form of gasoline taxes, sales taxes, and similar levies.

"The Government wants to increase this take, but is setting about the matter in an extraordinary way. It proposes to up the tax rate while breaking up the solid industrial base from which these taxes have to come. The eye has to be faster than the hand to understand that kind of logic."

*T. S. Petersen, president, Standard Oil Co. of California, addressing the Seattle Rotary Club.*

### Steel Squawk

"It is no secret that PAD is very unhappy with the quantities of steel allocated to it by DPA. We propose to argue vigorously that those quantities should be increased in the light of standards prescribed by the act. You will probably be unhappy with the amounts of steel made available to you by PAD. If so, it is your privilege to complain, but before you do, read the Act, and complain in the light of those standards prescribed by it. Such complaints will receive the most careful consideration."

*C. Pratt Rather, assistant deputy administrator, Petroleum Administration for Defense, addressing Kentucky Oil and Gas Association, Ashland.*

# CALENDAR

**July**

Western Petroleum Refiners Association, regional meeting, Broadview Hotel, Wichita, July 19-20.

Wyoming Geological Association, sixth annual field conference, Rawlins, Wyo., July 31-August 3.

**August**

Wyoming Geological Association, sixth annual field conference, Sinclair, Wyo., August 1-3.

Society of Automotive Engineers, Inc., West Coast meeting, Olympic Hotel, Seattle, August 13-15.

Western Petroleum Refiners Association, regional meeting, Leonard Refineries Auditorium, Alma, Mich., August 17.

American Institute of Electrical Engineers, Pacific general meeting, Multnomah Hotel, Portland, Ore., August 20-23.

Eleventh Annual Appalachian Gas Measurement Short Course, West Virginia University, Morgantown, W. Va., August 27-29.

**September**

American Chemical Society, 120th national Diamond Jubilee meeting, Hotel Statler, New York City, September 3-7.

Pacific Coast Gas Association, annual convention, Fairmont Hotel, San Francisco, September 4-6.

Michigan Petroleum Association, annual fall convention, Ramona Park Hotel, Harbor Springs, Mich., September 6-7.

International Union of Pure and Applied Chemistry, sixteenth conference, Hotel Statler, New York City, September 8-9.

New York Oil Heating Association, Inc., Hotel Statler, New York City, September 10.

International Congress of Pure and Applied Chemistry, twelfth conference, Hotel Statler, New York City, September 10-13.

Instrument Society of America, Coliseum, Houston, September 10-14.

American Society of Mechanical Engineers, Industrial Instrument and Regulators division, Coliseum, Houston, September 10-14.

National Petroleum Association, Hotel Traymore, Atlantic City, September 12-14.

International Union of Pure and Applied Chemistry, sixteenth conference, Hotel Statler, Washington, D. C., September 14-15.

American Institute of Chemical Engineers, national meeting, Sheraton Hotel, Rochester, N. Y., September 17-19.

Western Petroleum Refiners Association, regional meeting, Hotel Henning, Casper, Wyo., September 20-21.

American Association of Oilwell Drilling Contractors, eleventh annual meeting, Texas Hotel, Fort Worth, September 24-25.

American Society of Mechanical Engineers, sixth petroleum mechanical-engineering conference, Mayo Hotel, Tulsa, September 24-26.

American Society of Mechanical Engineers, fall meeting, Radisson Hotel, Minneapolis, September 25-28.

**October**

American Institute of Mining and Metallurgical Engineers, petroleum branch, fall meeting, Oklahoma City, October 3-5.

California Natural Gasoline Association, twenty-sixth annual fall meeting, Ambassador Hotel, Los Angeles, October 4-5.

Texas Mid-Continent Oil and Gas Association, annual meeting, Hotel Beaumont, Beaumont, Tex., October 8-9.

American Oil Chemists' Society, fall meet-


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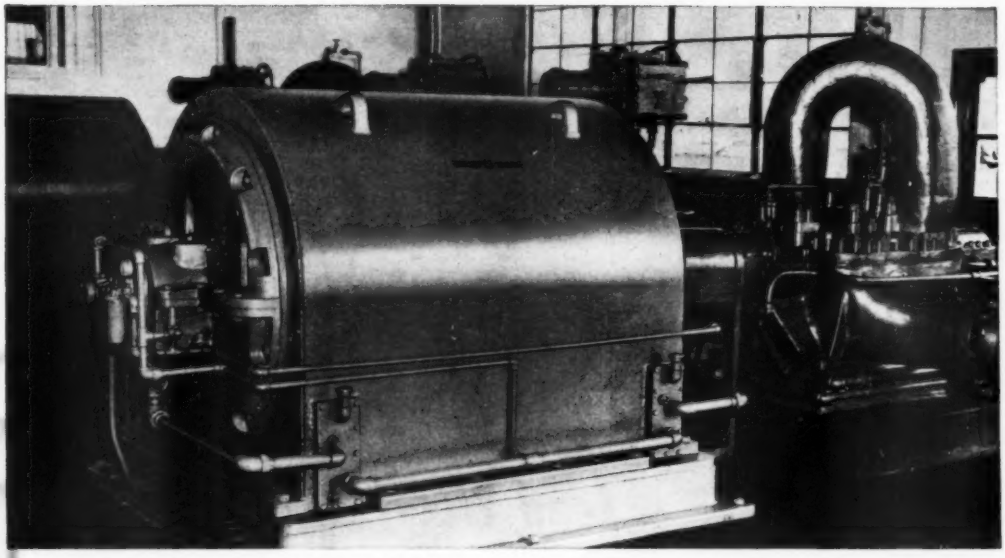

**These two G-E forced base-ventilated motors**—each rated 1500 hp, 2300 volts, 3600 rpm—drive centrifugal pumps in the Mayersville, Miss. station of the Mid-Valley Pipeline Company's 22-inch crude oil line. Two other stations in this 1000-mile line are similarly equipped.

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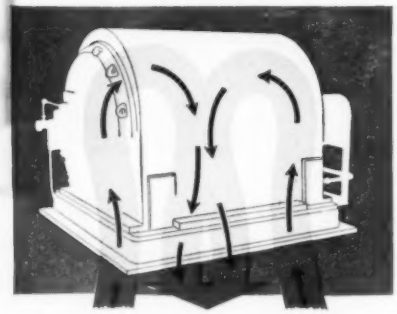

**Simplified sketch** shows how air inlet and outlet passages in motor's base all open directly down through the foundation to the source of ventilating air. By first starting a separate motor-driven blower, any hazardous gases are cleared from the main motor before latter is started.

Driving pipeline pumps that deliver 157,000 barrels per day, these two General Electric 1500-hp forced base-ventilated motors with separate motor-driven blowers combine both protective and low-cost advantages:

**(1) Separate motor-driven blower**—started up in advance—purges the main pump motor and duct system of any gases that may have accumulated during a shutdown period. It also removes heat quickly and effectively from the main motor during operation.

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These motors are part of a broad G-E line for every electrified pipeline need. Let a G-E pipeline specialist help you select the right motors for *your* pipeline, and write for bulletin GEA-5423 on electrification of oil pipelines. *General Electric Co., Schenectady, N. Y.*

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***Everything you need to cut oil pipeline costs —ELECTRICALLY!***

GENERAL ELECTRIC

ing, Edgewater Beach Hotel, Chicago, October 8-10.

National Safety Council, thirty-ninth national safety congress and exposition, Stevens Hotel, Chicago, October 8-12.

Indiana Independent Petroleum Association, fall convention, Hotel Severin, Indianapolis, October 13-14.

Oil Progress Week, October 14-20.

American Petroleum Credit Association, twenty-seventh annual conference, Adolphus Hotel, Dallas, October 15-17.

American Gas Association, annual convention, Kiel Auditorium, St. Louis, October 15-17.

National Metal Congress and Exposition. American Society for Metals, American Welding Society, American Institute of Mining and Metallurgical Engineers, and Society for Non-Destructive Testing, Hotels Statler, Book-Cadillac, and Detroit-Leland, Detroit, October 15-19.

Institute of Gas Technology, annual meeting, Chicago, October 18.

National Association of Corrosion Engineers, South Central Region, annual meeting, Corpus Christi, Tex., October 18-20.

Independent Petroleum Association of America, Shamrock Hotel, Houston, October 21-23.

American Institute of Electrical Engineers, fall general meeting, Hotel Cleveland, Cleveland, October 22-26.

Society of Automotive Engineers, diesel-engine division, Drake Hotel, Chicago, October 29-30.

Society of Automotive Engineers, fuels and lubricants division, Drake Hotel, Chicago, October 31-November 1.

**November**

American Petroleum Institute, thirty-first annual meeting, Stevens Hotel and Palmer House, Chicago, November 5-8.

Gulf Coast Association of Geological Societies, first annual meeting, Roosevelt Hotel, New Orleans, November 15-17.

Rocky Mountain Oil and Gas Association, annual meeting, Cosmopolitan Hotel, Denver, November 15-17.

Society of Exploration Geophysicists, regional meeting, Baker Hotel, Dallas, November 19-20.

American Society of Mechanical Engineers, annual meeting, Chalfonte-Haddon Hall, Atlantic City, November 25-30.

Twenty-third Exposition of Chemical Industries, Grand Central Palace, New York City, November 26-December 1.

**December**

American Institute of Chemical Engineers, annual meeting, Chalfonte-Haddon Hall, Atlantic City, December 2-5.

Chemical Specialties Manufacturers Association, thirty-eighth annual meeting, Mayflower Hotel, Washington, D. C., December 3-4.

New York Oil Heating Association, Inc., Hotel Statler, New York City, December 10.

**NOMADS**

**Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.**

**Dallas-Fort Worth Nomads, first Monday of each month, Greater Dallas Club.**

**Houston Nomads, second Monday of each month, Ye Ole College Inn, Houston.**

**Los Angeles Nomads, second Wednesday of each month, Jonathan Club.**

**New York Nomads: September 11, luncheon, Downtown Athletic Club; September 18, golf party, Knoll Golf Club, Boonton, N. J.; October 1 and October 29, regular meetings, Louis Sherry's; December 8, Christmas dinner dance, Hotel Pierre.**


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# JOURNALLY Speaking

## Vest Busters

THIS week the editors of our favorite oil publication may not seem to recognize you if you should meet them on the street.

Their noses may seem to have a slight upward tilt, and their expressions might seem to appear a little self-satisfied and smug. It never lasts. The condition existed for a few days about this time last year. This year it may be a little more marked and noticeable.

The reason is obvious. Right at the top of this page, in fact. The engraving you see there is of three awards presented to our favorite oil publication for editorial achievement during 1950. They were awarded by Industrial Marketing in that magazine's annual competition among business papers representing all of the industries and businesses in the country.

Last year we won one. This is the first year the publication has received three.

At left is the award of merit for the "outstanding series of articles," presented for the series, "The Refiner's Notebook," a weekly feature based last year on refinery instrumentation.

Center is the award of merit in the "outstanding single article" classification. Here our entry was "Deep Rotary Drilling," published in the Annual Drilling Number October 5, which showed the equipment required for a deep-drilling venture and illustrated in step-by-step fashion the entire operation.

At right is the award of merit for the "best single issue," and that was given the Pipe-Line Number of September 21.

It was the thirteenth annual business-paper editorial-achievement competition of Industrial Marketing. It marks the seventh consecutive year in which our favorite oil publication has hung an award of merit on its editorial walls.

And, ours was the only oil publication to be honored with one of the coveted awards.

## Dee of D & D

PRIDE of the editors isn't confined this week to the editorial achievements reflected in the Industrial Marketing awards.

They're also proud of one of the crew.

Lucy Dee Owen, the brown-eyed member of the staff down in Houston, has just been elected first vice president of the national Desk and Derrick Club, the organization of women in the oil industry which sprang up as a local and quickly spread clear across the oil country.

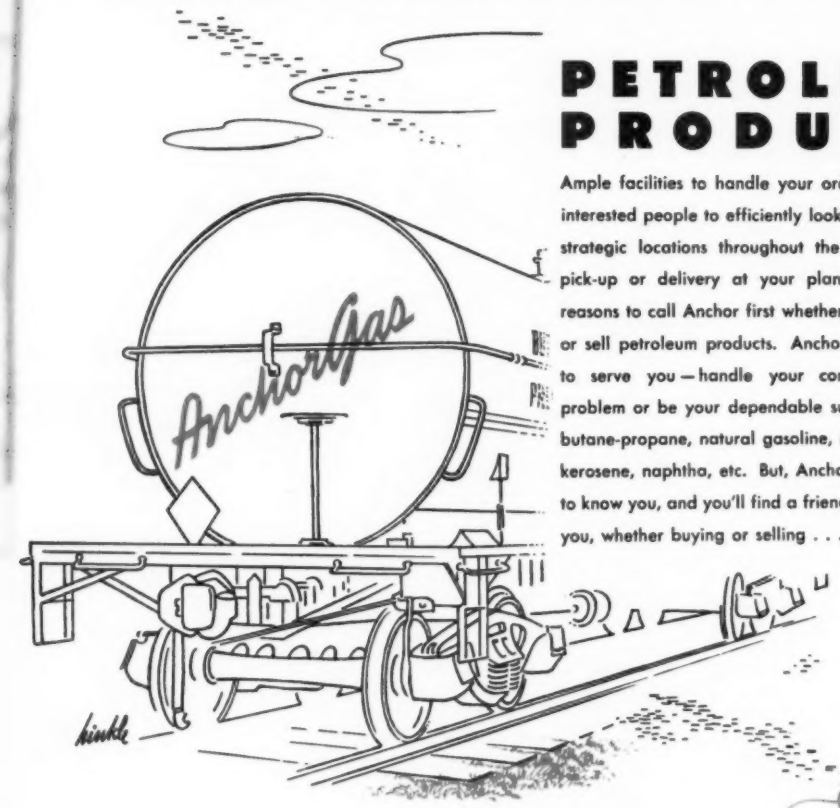
As first vice president, Dee will be editor of the club's monthly publication. In her modest way she says: "I seriously doubt if we get one out before fall."

In view of the forest-fire development of the movement, and the fact that the women even had a representative at The Hague, we're just wondering how long it will be before they'll be electing officers of the international organization.

We're wondering, too, about the content of the papers to be read at the national meeting, sure to be held before long.

*Ted Armstrong.*

# BUYING SELLING

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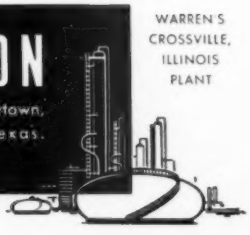

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The slogan "Where there's Petroleum there's Progress" is soundly based. The most outstanding characteristic of the oil business is its constant change. It would be difficult to name one oil problem that can be considered solved, one practice that is permanently routine, one method that is the final word.

Proof of this can be had by thumbing the news pages of the last half-dozen issues of the Journal. During these 6 weeks there have been announcements of more than a dozen new processes and methods, any one of which may result in changing the operating practices of a considerable portion of the industry.

There have been reports of successful drilling with air and with oil instead of the usual drilling mud, of using hot-water jets for lifting heavy crude from the wells, of carbonic acid in secondary recovery, and of an ultrasensitive temperature-logging instrument for locating formations in a well. All of these are in the field of drilling and producing, a field which has a history of nearly a century.

In the field of processing which, to the layman, might seem more complicated and hence more fertile ground for invention, the news announcements concerned a new catalyst air-lift system, a fluid hydroforming process, catalytic reforming of low-octane naphthas, high-vacuum distillation and visbreaking of residuum, a petrochemical process for producing acetylene, a new sulfur-recovery process, a new method for removing gas hydrates, and dry-air storage of lubricating oils.

The past 6 weeks may have been slightly unusual in the concentration of announcements of new methods and devices, but they are entirely typical of the pace of invention and ingenuity in the petroleum business. The industry cannot remain static under the two-pronged goad of competition among operators and the challenge of the forces of nature.

Everyone in the industry from top to bottom can and does contribute to this progress, particularly the designers and manufacturers of equipment, who have always been as much a part of the petroleum industry and its progress as anyone.

The pace of invention and change is accelerating, and marches through every branch of the industry, yet every oil man knows that the accepted practice of today may be obsolete tomorrow. This is as it should be. It gives petroleum the name of the fastest-moving of all basic industries and is its guarantee of remaining in the forefront of conservation of resources and service to consumers.

# THIS WEEK

**INTERNATIONAL**—Complete shutdown of Abadan refinery appears inevitable as negotiations remain stalemated. . . . Anglo-Iranian cuts operations to 45 per cent of normal, says plant can operate on this basis only until product storage is full some 20 days hence. . . . Tanker traffic stopped and product supply to outside world is halted. . . . Some crude still moving from another port. . . . Dissension reported among members of Iranian Government board appointed to take over operations. . . . Some optimism still remains among company officials in spite of critical situation. . . .

**PIPE LINES**—El Paso Natural given light by U. S. district judge to build 24-in. gas line across Navajo Reservation in Arizona. . . . Company now can resume work on $40,000,000 line halted by Interior Secretary Chapman, who refused to grant permit to cross government lands. . . . ¶Permian Basin Pipe Line Co. says it will build 375-mile gas line from Hobbs to Hugoton field. . . . ¶FPC approves Northern Natural plans to increase capacity of system north of Kansas by 50,000,000 cu. ft. daily. . . .

**ACTIVITY**—Crude production averaged 6,104,000 bbl. daily for week ended June 30, down 15,500 bbl. daily. . . . ¶Well completions totaled 924 compared with 884 for previous week and 911 for same week last year. . . . Wildcat completions were up 34 wells to 232. . . . ¶Rotary rigs operating in United States on June 25 increased 46 rigs to 2,552 for a new all-time record. . . .

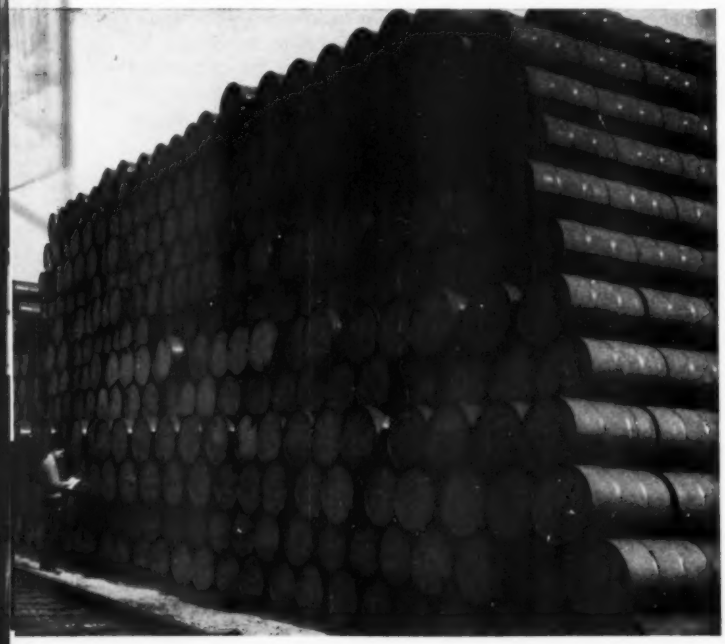
**TRENDS**—Rotary rigs operating in United States averaged 2,518 for 4-week period ended June 25. . . . This is 321 more rigs than the average for same weeks of 1950.

**REFINING**—Gilmore Refineries, Inc., will build 25,000-bbl. refinery in Odessa, Tex. . . . Products will be piped to Los Angeles Harbor area. . . . ¶Construction to begin soon on first fluid Hydroformer at Pan-Am Southern's Destrehan, La., refinery. . . . Process design completed. . . . ¶Richfield signs patent-license agreement with Atlantic Refining Co. permitting construction of catalytic reforming unit at Richfield's 100,000-bbl. Watson, Calif., refinery. . . .

**PRODUCTION**—Increased secondary-recovery output being obtained in Pennsylvania pilot flood using water heated at bottom of injection well. . . . Technique provides hotter water, higher entry rate, better results in tight sands. . . . ¶Commercial detergent used successfully to clean sand face in injection well drilled with oil-base mud. . . . ¶What may be world's deepest producer being tested at Weeks Island by Shell Oil Co. . . . Well on initial test flowed at rate of 188 bbl. daily through perforations between 16,572 and 16,600 ft. . . .

**MATERIALS**—PAD asks for 2,336,470 tons of steel for fourth quarter. . . . Agency says request is 250,000 tons below needs, and this all in line pipe because of inability of mills to increase capacity this year. . . . ¶Unitization of operations will stretch supply of materials, Chapman tells industry. . . . ¶Donald Teis, formerly of Creole, succeeds Millard K. Neptune as assistant director of PAD's production division. . . . ¶Rules for use of allotment numbers by industry outlined by NPA. . . .

**GOVERNMENT**—House judiciary committee stamps 18 to 6 approval on bill to quitclaim tidelands to states. . . . House vote next step, with approval expected. . . . Tougher sledding seen in Senate with presidential veto if it passes. . . . ¶Treasury Department says oil-tax collections during first 11 months were $62,000,000 above same period last year. . . .



*NOT SO MANY.—To a production man this might seem like quite a stack of oil drums, but refiners know there aren't nearly so many containers available as it would be nice to have. In fact, the National Production Authority last week ordered drum manufacturers to reserve 5 per cent of their production for exporters of petroleum products, who haven't been able to get enough. These drums, incidentally, are part of those filled by Socony-Vacuum Oil Co. for lubricating the recently launched S.S. United States. This fast luxury liner requires 800 bbl. for a complete lubrication job, enough to take care of a car with a 6-qt. crankcase for 28,000,000 miles with an oil change every 1,000 miles.*

# Dakota Play Widens

## Acreage under lease now totals 26 to 28 million acres, with 6 million added this year; Shell is biggest holder

**Kenneth B. Barnes**

BISMARCK, N. D.—A visit to this capital city quickly reveals the extensive activity in lease acquisition, purchase of mineral deeds, and seismic explorations in the vast Williston basin.

The deepest part of the basin is centered in northwestern North Dakota, and with its sides extending across into Montana and South Dakota, and northward into the Canadian provinces of Manitoba and Saskatchewan (see map).

It is estimated that there are now 26 to 28 million acres under oil lease in North Dakota. These cover the western four-fifths of the state (eastward the pre-Cambrian Canadian granite shield comes up to shallow depths). Leasing so far this year has amounted to about 6 million acres.

There are about 30 of the large oil companies and 25 independents represented in North Dakota's bulk portion of Williston basin.

Largest leaser in the state is Shell Oil Co., with holdings of approximately 2½ million acres. Magnolia Petroleum Co. is probably the second biggest, since its holdings, like Shell's, are not held in partnership with other companies.

Other companies, such as Union Oil Co. of California, Phillips Petroleum Co., Pure Oil Co., and Continental Oil Co., have large amounts of acreage under lease. Many of them, like Pure and Phillips, have combined acreages. Union of California has two partners, Hancock Oil Co. and Signal Oil & Gas Co., in the 2-million-acre block it recently leased in East and Central North Dakota. Union is the operator on this.

Back in the original North Dakota play, when World War II came, most

**SIGNIFICANT WILDCATS DRILLED IN NORTH DAKOTA**

1—California Standard Oil Co. 1 Daly, 10 miles west of Virden, in Manitoba, found oil at 2,340 ft., 5,368 ft. TD.

2—California Oil Co. 1 Kamp, 16 miles southeast of Ray, Williams County, 10,281 ft. TD, abandoned 1938.

3—Amerada Petroleum Co. 1 Iverson, 8½ miles south of Tioga, Williams County, now bottomed at 11,955 ft., flowed 307 bbl. oil in 17-hour test.

4—Karnes and Price 1 Kline, Carpio, Ward County, 8,435 ft. TD, abandoned November 1949.

5—Souris Valley Oil Co. 1 Downey, 5½ miles north of Westhope, in Manitoba, suspended December 1950 at 3,228 ft., oil show reported.

6—Union Oil Co. of California 1 Aanstad, 4 miles south of Hampden, Ramsey County, stratigraphic test to below 3,200 ft., probably struck granite, abandoned November 1949.

7—Plymouth Oil Co. 1 Leutz, 20 miles north of Hebron, Mercer County, 12,526 ft. into Ordovician formation, abandoned September 1950.

8—Carter Oil Co. 1 Semling, Oliver County, to 8,850 ft., abandoned October 1940.

9—Continental Oil Co. and Pure Oil Co. 1 Davidson, 13 miles north of McKenzie, Burleigh County, 6,685 ft. TD., abandoned October 1949.

10—Magnolia Petroleum Co. 1 N. D. State "A", 11 miles north and east of Steele, Kidder County, 5,609 ft. TD., abandoned December 1950.

11—Glenfield Oil Co., Glenfield, Foster County, to granite at 3,240 ft. TD., abandoned in 1928.

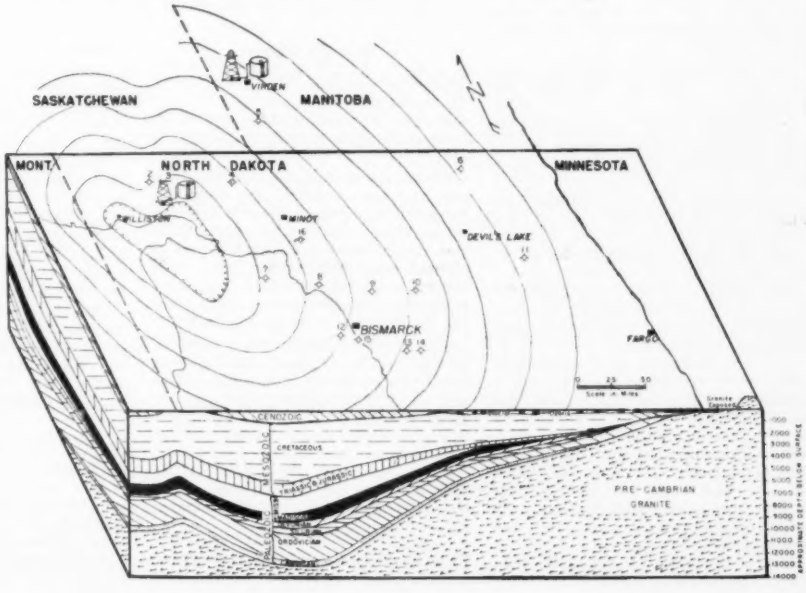
12—Carter Oil Co. No. 1 stratigraphic test, 9 miles west of St. Anthony, Morton County, 4,930 ft. TD., abandoned August 1942.

13—Roeser and Pendleton et al. 1 Weber, 3 miles north and east of Linton, Emmons County, to granite at 5,556 ft., abandoned September 1950.

14—Northern Ordnance Co. 1 Franklin Investment Co., 8 miles east of Linton, to granite 5,359 ft., abandoned August 1943.

15—Phillips Petroleum Co. and Carter Oil Co. 1 Sturn, 3 miles south of St. Anthony, Morton County, to basement 7,790 ft., abandoned June 1951.

16—Samedan 1 Vaughn Hanson, 6 miles west of Turtle Lake, McLean County, to Ordovician formation at 9,033 ft., abandoned September 1950.




*Shown on this map (courtesy G. Wendell Smith, consulting geologist, Bismarck) are the sparse number of significant drilling tests that have been made in the huge Williston Basin straddling the United States-Canadian line. The accompanying table lists information for each. In the June 14 issue of the Journal, page 135, is a short article and map which discusses the present wildcat drilling activity.*

of the companies dropped and canceled their leases. All but Magnolia pulled out of the city and state in 1942 and 1943. Magnolia kept its offices here until August 1944.

Continental Oil Co. kicked off the second big leasing boom in the spring of 1949. That summer Magnolia came back and reopened offices here. Shell and Union followed, and in 1950 Phillips established itself in Bismarck.

Oil concerns that now have land under lease in North Dakota include Shell, Union, Magnolia, Amerada Petroleum Corp., Phillips, Pure, Continental, Lion Oil Co., Cities Service Oil Co., Ohio Oil Co., Sohio Oil Co., The California Co., Plymouth Oil Co., British-American Oil Co., Deep Rock Oil Co., Stanolind Oil Co., Hunt Oil Corp., Sun Oil Co., Sunray Oil Corp., Signal Oil Co., Carter Oil Co., Delhi Oil Co., and Hancock.

Among the largest independent leaseholders are Leach and Warren, John Allen, R. V. Hodge, A. M. Fruh and Wilhite, Seay and Bryans, all with offices in Bismarck, and Cox and Hamon, J. P. Evans and Gaddis Bass, independents with holdings in the state.

**Seismic expansion.**—Activity in seismograph work has more than doubled this year. There are 16 crews now shooting, and another is scheduled to begin soon. Twelve are in North Dakota, 4 in South Dakota. There also are 5 gravity meter crews working in the two states.

**North Dakota.**—The seismic crews exploring in North Dakota, as to operating location, seismic company, and client, are as follows:

Out of Hettinger, a Magnolia Petroleum Co. crew, for Magnolia, and a Petty Geophysical Co. crew, for Shell Oil Co.

Out of Mandan, a Rogers-Ray Geophysical Co. crew for Stanolind Oil & Gas Co.

Out of Dickinson, a Cities Service crew, for Cities Service Oil Co., and a Dayton Exploration Co. crew, for Ohio Oil Co.

Out of Langdon and Cando, two United Geophysical Co. crews, for Union Oil Co.

Out of Rugby, another Petty crew, for Lion Oil Co.

Out of Minot, a Petroleum Consultants, Inc., crew, for Phillips Petroleum Co., and an Allied Geophysical Co. crew, for Stanolind.

Out of Williston, a Geotechnical Corp. crew, for Pure Oil Co., and a Geophysical Service, Inc., crew, for Gulf Oil Corp.

**South Dakota.**—Out of Faith, a General Geophysical Co. crew, for Ohio Oil Co., and a Kerr-McGee Oil Industries crew, for Kerr-McGee.

Out of Lemmon, a Petty crew, for Shell Oil Co.

Out of Mobridge, a Geogseis, Inc., crew, also working for Shell.

Amerada Petroleum Co. also has a crew scheduled to work in the Williams County area soon, although it is not here yet.

Petroleum Consultants were working out of Bismarck for Phillips until recently.

Two gravity meter crews are in Dickinson, one is headquartered in Minot, another in Williston, and the fifth is stationed at Newell, S. D.

It is estimated that an average crew of about 15 men, with one or two trucks, costs about $15,000 a month to keep going. It is generally believed the 16 now at work will continue until winter.

**Prices.**—Lease and mineral deed costs have advanced considerably since Amerada Petroleum Corp.'s famed 1 Iverson discovered the first oil in the state in April of this year. *(See The Oil and Gas Journal, April 12, page 69; April 26, page 71.)*

Before, leases were being written at 25-cent bonus and 25-cent per year rentals, also 50 cent-50 cent and $1-$1. Prices now are usually double that scale, or better. Mineral deeds now are $1.50 per acre and up, mostly up, when purchases can be made. Some 5,000,000 acres of mineral rights have been purchased altogether in the North Dakota oil play.

**Oil history.**—Although still a "one oil well" state for all its 44,834,560 acres, the search for oil in North Dakota is not new. It started in 1922. The first well was drilled in lower Adams County in 1922, by Prairie Oil & Gas Co., now Sinclair Oil Co., but even its depth is unknown.

A year later the Des Lacs Western Oil Co. went to 3,930 ft. southwest of Minot in Ward County.

In 1927-1929, Herman Hanson sank a 1,990-ft. hole near Turtle Lake.

Between 1928 and 1938 a few other medium-depth wildcat tests were drilled.

The 1940's started the big "lease boom" throughout the state. Although there was much leasing activity at various times up to the present intensive play, actually only very few test wells were drilled, and even at this time the state has one of the lowest densities of test wells per average county of any area in a large prospective oil province in the United States.

The accompanying map and table show location of 16 of the most significant exploratory test locations that have been drilled, from a geologic and stratographic standpoint.

## TECHNOLOGY

# Hot-Water Injection

### Quicker entry of flood water, better tight-sand results provided by bottom-hole heater in Pennsylvania pilot test

**George Weber**

ENCOURAGING results are being obtained through the use of heated water in secondary-recovery field tests now under way in the Bradford area of western Pennsylvania.

This latest of several research projects now under way at the nonprofit Bradford laboratory of the Pennsylvania Grade Crude Oil Association was undertaken as a pilot test 7 months ago. Results to date, while incomplete, indicate that the new technique has economic merit, and the field work is being continued.

The test well, bottomed at 1,200 ft. in the Bradford Third Sand, is located on the Quaker State Oil Refining Corp.'s McManus lease in the West Branch district near Bradford. In contrast to other secondary-recovery methods employing hot water, this project heats the water at the well bottom, so that water enters the sand formation at top temperature.

**How it works.**—A specially designed electric heater is lowered to the well bottom on the end of a string of pipe through which runs a high voltage electric cable. The cable is protected from contact with input water, which exerts a bottom-hole pressure of 1,500 psi.

Water, injected under surface pressure, is heated at the well bottom to 300° F. At that temperature, the water enters the oil sand at a rate 25 per cent greater than previously, indicating a quicker and more economical recovery of oil remaining in the formation.

Of greater importance, however, is the fact that, percentagewise, the so-called tight sands respond better to hot water treatment than do loose sands. Thus, the greatest effect is in the tight sands, where it is most needed.

**Results.**—Results in the single pilot well and in the laboratory have proved so encouraging that further experiments are planned in a second injection well, located on the A. C. Simmons Booth lease in West Branch.

The project is under the supervision of Dr. J. N. Breston, director of the

association's Bradford laboratory. Pennsylvania Electric Co. and Quaker State's production division have cooperated actively in the experiments.

**Other projects.**—If proven an economic success, the hot-water technique may be used in conjunction with other methods which the association has under development.

One of the most successful projects investigated by the Bradford laboratory involves the selective plugging of nonproductive formations. Employing a silica gel and delayed-setting plastic, this technique enables engineers to shut out water in oil and gas wells and to seal off casing leaks.

In Bradford field alone, according to the association, this method of placement plugging of oil wells is credited with saving at least 200 producing wells and casing worth an additional half million dollars. The method of plugging "thief" sands in water injection wells with a resin-in-water emulsion also originated in the Bradford district.

Selective plugging was first thought of about 14 years ago, and the perfected method has now been in use for almost 4 years.

Another project, involving the use of detergents in input water, now appears economically attractive. Earlier research on this method indicated that detergent loss would be too high. Later experiments have improved the efficiency of the method, however, and the declining cost of detergents has further improved the economics of the method. Detergents have been used in small-scale field tests; two South Bradford properties and one at Cyclone.

Another successful development in water-flooding operations in the area concerns the use of amine-type chemicals to kill bacteria and prevent corrosion in injection wells.

Current projects at the Bradford laboratory and at Pennsylvania State College include studies of the manner in which oil or water adheres to the producing formation, how the injection of gas prior to water flooding can increase oil production, and how the use of tracers or dyes in the flood water can yield information on reservoir characteristics to improve operating practices.

Radioactive tracers are now being used at Bradford to facilitate the measurement of oil distribution in experimental sandstone reservoirs.

## Wax Development

### Continuous molding process is announced by Magnolia

BEAUMONT.—A chocolate molding machine advertisement spotted by a refinery engineer has resulted in a revolutionary wax-molding process. Magnolia Petroleum Co. will describe the new continuous wax-molding process for the petroleum-refining industry at the July 20 meeting of the Western Petroleum Refiners Association at Wichita, Kans.

Company officials think the new system may largely replace the batch method of molding in use throughout the industry for more than 30 years.

Improvements claimed for the process include a great increase in speed of wax manufacture, high quality of product, and easier use with modern methods of handling and packaging. Plant housekeeping is also improved with the new method.

The process involves circulation of molten wax through a cooling chamber on continuous pan conveyors. Automatic feeding through a piston arrangement is one of the novel features. The conveyor system is so designed to allow wax-filled pans to shuttle back and forth in the chamber without causing unwanted ripples.

The machine was developed by Magnolia personnel at the Beaumont refinery in collaboration with J. W. Greer Co., Cambridge, Mass.

*(An engineering article describing this new process will appear in the July 26 issue of The Oil and Gas Journal.)*

## Injection Twist

### Beef-tallow chemical ups water-flood oil recovery

CHICAGO.—Armour & Co., of this city, and Oil Recovery Chemicals, Austin, Tex., have announced signing of a contract for introduction of surface-active chemicals to increase oil recovery from water-flood operations in southwestern producing areas.

The latter firm was recently organized by Paul D. Torrey, petroleum engineer of Houston, and Allerton Cushman, former Houston investment banker.

Two kinds of chemicals are involved in treating injection water. One, Ethomid HT/60, is reported to increase greatly the ease with which the water flows through formation sand. Tests have shown that this chemical, made from beef tallow, may increase the total amount of oil produced by as much as 10 per cent per well.

The second chemical is said to prevent corrosion of casing, water lines, and equipment. It also kills bacteria, introduced with flood water, which block sand pores of the producing formation. These chemicals are quaternary - ammonium compounds. Arquad 2C is the quaternary which has proved most successful during tests.

**Effective dilution.** — Both chemicals are effective in quantities as small as five parts to a million parts of water.

The chemicals are manufactured by Armour & Co. at a plant opened late in 1949 at McCook, Ill. They have been tested in California, Pennsylvania, and Texas oil fields.

Because no two oil reservoirs are alike, Armour said, the chemical treatment of each must be tailor-made to a particular field. Careful studies and extensive tests are needed to ascertain requirements.

**Service laboratory.** — Oil Recovery Chemicals has established an oil-field service laboratory in Austin. The city is also the location of the state research project dealing with secondary recovery of oil.

*A detailed engineering article by the chemical-engineering department of Armour & Co., entitled "Economic Aspects of Secondary Oil Recovery," which discusses these new surface-active oil-recovery agents, will appear in an early issue of The Oil and Gas Journal.*

## Hole Cleanser

### Detergent opens pores of injection-well sand face

BARNSDALL, Okla.—Use of a commercial detergent to clean the sand face in a water-injection well that had been dug using oil-base mud has indicated successful results.

This unusual method of washing a well was carried out at a pilot water-injection project in Flatrock field, NE 30-21n-12e, southeastern Osage County, by Sunray Oil Corp.

Sunray needed core information for the project. To get it, the company diamond cored the Bartlesville sand using oil-base mud.

Use of oil-base mud for drilling a water-injection well is not an accepted practice as the mud is designed for oil wells. Due to the partial sealing of the sand face by the low-gravity oil in mud, Sunray was left with the problem of thoroughly cleaning the sand face to provide maximum permeability to water.

After oil-base filtrate had been dissolved with crude oil, Sunray engineers, in an attempt to further clean the face, covered the 47 ft. of exposed sand with a solution of 24 lb. of detergent in 3 bbl. of water. The solution was agitated for 2 hours. The hole was bailed clean and the operation repeated.

That the treatment had favorable results was indicated by the fact that prior to washing, the well would fill up with 160 ft. of water and oil overnight. After the double application, over 500 ft. of water and oil came up in the hole in the same length of time.

# Small-Refiner Gain

## Defense program giving refiners under 20,000-bbl. class bigger percentage of total United States crude capacity

WASHINGTON.—The position of the small refiners, as a group, is being strengthened under the defense program.

One of the byproducts of the accelerated tax-amortization program will be an increase in the relative share of total refining facilities owned by the smaller companies, according to Deputy Petroleum Administrator Bruce K. Brown.

Analysis of certificates of accelerated tax amortization for basic refining facilities recommended by PAD up to May 12 discloses that the proportion of crude-running capacity owned by the larger companies will decline slightly when the new facilities are all in operation while that of the smaller refiners will have increased. *(See The Oil and Gas Journal, May 31, page 58.)*

Assuming that a 50 per cent ownership of stock is equivalent to control, the analysis showed that the 20 largest companies, each controlling capacity in excess of 50,000 bbl. a day, had an aggregate crude capacity of 5,618,250 bbl. daily last January 1, or 80.68 per cent of the nation's total. These companies have been given certificates for an additional 223,480 bbl. daily of capacity, but after all facilities recommended for certificates have been built their proportion will drop to 80.05 per cent.

The 20 next largest companies, controlling between 20,000 and 50,000 bbl. daily capacity, had an aggregate of 604,500 bbl. daily capacity on January 1. They have received certificates for 26,000 bbl. daily of new facilities, but their share of the total is slated to drop from 8.69 to 8.64 per cent.

Another 184 companies, controlling capacity of less than 20,000 bbl. a day, had a total of 740,894 bbl. daily at the beginning of the year. They have been given certificates for 84,636 bbl. daily of additional capacity, and their share of the total will increase from 10.63 to 11.31 per cent.

The same trend has been evidenced in the case of catalytic cracking capacity, Brown said.

Here, the 20 largest companies owned 86.14 per cent of the national total at the beginning of the year but will have only 85.24 per cent after all new facilities are built; the share of the intermediate group will drop from 10.15 to 9.37 per cent, while the 184 smaller companies will increase their proportion from 3.71 to 5.39 per cent.

Certificates approved up to May 12 will provide additional capacity of 334,116 bbl. daily in basic refining capacity and 136,319 bbl. daily in catalytic cracking capacity, as shown in the accompanying table.

**CRUDE-OIL TOPPING CAPACITY**

| | Capacity as of Jan. 1, 1951 (bbl. daily) | Share of national capacity (per cent) | Additional capacity recommended for tax certificates (bbl. daily) | Adjusted capacity (bbl. daily) | Adjusted share of national capacity (per cent) |
|---|---|---|---|---|---|
| 20 largest companies | 5,618,250 | 80.68 | 223,480 | 5,841,730 | 80.05 |
| 20 next largest companies | 604,500 | 8.69 | 26,000 | 630,500 | 8.64 |
| 184 smallest companies | 740,894 | 10.63 | 84,636 | 825,530 | 11.31 |
| Total capacity | 6,963,644 | 100.00 | 334,116 | 7,297,760 | 100.00 |

**CATALYTIC CRACKING CAPACITY**

| | | | | | |
|---|---|---|---|---|---|
| 20 largest companies | 672,552 | 86.14 | 109,180 | 781,732 | 85.24 |
| 20 next largest companies | 79,250 | 10.15 | 6,660 | 85,910 | 9.37 |
| 184 smallest companies | 29,008 | 3.71 | 20,479 | 49,487 | 5.39 |
| Total capacity | 780,810 | 100.00 | 136,319 | 917,129 | 100.00 |

### Deepest Producer?

NEW ORLEANS.—Shell Oil Co. is testing oil through perforations below 16,500 ft. at a Weeks Island well, indicating the world's deepest producing oil well.

The well, 1 H. P. Gonsoulin, 41-14s-7e, Iberia Parish, bottomed at 16,649 ft. and plugged back to 16,634 ft., initially tested 188 bbl. of 45.6°-gravity oil daily plus 2,893 M.c.f. of gas through perforations at 16,572-16,600 ft. Flow was gaged through 11/64-in. choke, under tubing pressure of 4,250 psi.

The world's record holder at present is a Standard Oil Co. of California well in Wasco field, Kern County, California. This well, the 5 Mushrush, produces oil from 15,530 ft.

# Industry Briefs

**BATON ROUGE.—Louisiana's July** allowable has been set at 640,669 bbl. daily, a drop of 2,894 bbl. from June's 643,563 bbl. daily. Last year's July allowable was 600,835, and in 1949 it was 500,000 bbl.

**LOS ANGELES.—General Petroleum Corp.** has been awarded an $8,167,000 contract to supply the armed forces with 2,390,000 bbl. of fuels during the last half of 1951.

**WICHITA.—Kansas' July allowable** has been set at 310,000 bbl. daily, unchanged from May and June. Nominations were for 346,642 bbl. daily, an increase of 3,038 bbl. from nominations of the previous month.

**PHILADELPHIA.—Sun Oil Co. last** week distributed 85,900 shares of stock worth $6,450,000 to more than 6,300 employes in the company's stock-purchase plan. Under the plan employes may invest up to 10 per cent of their salaries, and the company contributes $1 for each $2 saved. The distribution last week was of stock purchased during the past 5 years.

**WASHINGTON. — Defense Mobilization** Director Charles E. Wilson has called on oil consumers to fill their tanks during the next 3 months. He warns that when the defense program reaches top speed early next year, there will be a heavy burden on transportation which could produce spot shortages in various areas of the country.

**WASHINGTON.—A survey of the** industry's capacity to produce lubricating oils and waxes in relation to demand is being run by PAD to determine whether existing and planned production facilities are adequate to meet future defense and civilian requirements. Manufacturers are being asked for information on capacity to produce various types of lubricants and waxes; refining processes used; shipments during 1950 and the first quarter of 1951; and requirements for chemicals such as phenol, benzol, and toluene.

**LOS ANGELES.—U. S. District** Judge Leon R. Yankwich this week ruled that Richfield Oil Corp.'s exclusive-dealer contracts with service-station outlets are in violation of federal antitrust laws. The contracts involved provide that the marketing outlets may handle only Richfield products and accessories offered by Richfield.

# Cooperative Supply

## Government asks oil companies to cooperate in replacing Iranian oil, if and when; voluntary agreement approved

WASHINGTON.—American oil companies operating abroad have been asked by the Government to take such steps as may be necessary to alleviate the effects of interruption of oil supplies from Iran.

They will act under a voluntary agreement approved by Atty. Gen. J. Howard McGrath and Defense Mobilization Director Charles E. Wilson, with immunity from the anti-trust laws and Federal Trade Commission Act.

The agreement was given clearance by McGrath and Wilson as new dispatches from Teheran reported that tankers were leaving Iran unloaded, heralding the end, temporarily at least, of oil supplies from that country.

Wilson immediately sent letters to 18 American companies operating abroad, inviting them to participate in the agreement. Acceptances began to come in promptly and Petroleum Administration officials made plans to call the company representatives together within a few days.

**Procedure.**—The agreement, developed under Section 708 of the Defense Production Act of 1950, calls for the appointment of a "foreign petroleum-supply committee" on which each participating company will be represented by a top official. From the membership of this committee, an executive committee and such subcommittees as may be necessary will be appointed.

Meetings of the committee will be called by Deputy Petroleum Administrator Bruce K. Brown or Assistant Deputy Administrator C. Stribling Snodgrass, in charge of foreign operations, who will formulate the agenda.

PAD will ask the committee for plans to meet such situations as may arise. In suggesting a plan, the committee will be required to name the companies that will participate, the geographic areas affected and the nature of the action to be taken. Each plan will require approval by Wilson and McGrath, and provision is made for protests by companies in the event they feel the action called for would adversely affect them.

**Probable action.**—The committee is empowered to develop estimates of requirements, by products, for each country and area to be supplied and to recommend plans of action and supply schedules.

Plans to meet the immediate situation are expected to provide for such expedients as joint utilization of storage and distribution facilities, tankers, and other transportation facilities; alteration of refinery yields; increases in production of certain products through adjustments in quality specifications; exchanges, loans, sales and purchases of petroleum products; and joint utilization of tanker and cargo vessel capacity in such a manner as to eliminate or reduce to a minimum multiple port loading and discharging, cross-hauling and unnecessary ballast voyages.

Department of Justice officials promised that they will act speedily on any programs proposed by the industry committee. Expenses of the committee and subcommittees are to be met from a fund to which the companies will be permitted to make voluntary contributions.

The agreement permits joint action by the committee with other agencies, committees, or persons, and it is expected some sort of liaison will be established with a similar group recently set up by the British Government.

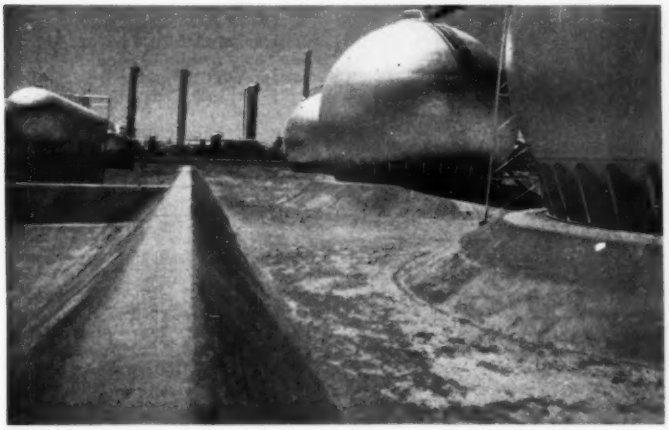
**The situation.**—The preamble to the agreement noted that current world supply and demand for petroleum products are "most delicately balanced." There is only negligible refining capacity not now in operation, all operating refineries are running at approximately normal maximum capacity, transportation facilities, particularly essential tanker tonnage, are strained to the limit, and loss of any substantial current source of supply could seriously jeopardize the interests of the free nations.

At the same time it was pointed out the defense and security programs of the United States and others of the United Nations have accelerated essential demands for oil.

Stocks at various key points throughout the world must be maintained at satisfactory working levels, and any substantial reduction in supplies would directly and adversely affect the interests of the United States. For these reasons, it was said, the United States must be prepared to meet and handle immediately the problems inherent in any substantial loss of world supplies.

The agreement emphasized that "petroleum supply is a world-wide matter and shortages in one location necessarily involve adjustments in remotely distant areas. This normal inter-reliance is sharply pointed up in times of emergency."

Development of the agreement was started some weeks ago when the strike at Abadan refinery of Anglo-Iranian Oil Co. cut production sharply and focussed attention on the possibilities of the serious situation which was later to develop. Considerable difficulty was encountered in secur-



**ANCHORED.—Inch-thick coatings of concrete were sprayed over more than two-thirds of a mile of fire walls in the tank farm of the new cycling plant in Elk City field, Oklahoma, because the red soil of the area is so loose and friable it would not remain in place long enough to be anchored by grass. The soil is so loose that clay and gravel were hauled as far as 15 miles to make foundations for field roads. Many acres of Bermuda grass, tons of crushed rock, and more than 60,000 sq. yd. of asphaltic coating help control soil erosion on plant site.**

ing the approval of the Department of Justice, which refused to grant any blanket immunity and insisted that each individual plan developed under the agreement be considered separately, but the problem was finally worked out.

**Companies invited.** — Invitations to participate in the agreement were sent by Wilson to American Independent Oil Co., Arabian American Oil Co., Atlantic Refining Co., Barber Oil Corp., Caltex Oil Products Co., Creole Petroleum Corp., Coronado Petroleum Corp., Gulf Oil Corp., Pacific Western Oil Corp., Socony-Vacuum Oil Co., Standard Oil Co. of California, Standard Oil Co. (N.J.), Standard Vacuum Oil Co., Superior Oil Co., The Texas Co., Tide Water Associated Oil Co., Union Oil Co. of California, and Venezuelan Petroleum Co.

## Defense Orders

WASHINGTON.—The following orders have been issued by the National Production Authority:

**Direction 2 to Regulation 4,** June 25: Permitting the use of defense ratings during July by exporters of replacement parts and accessories for all types of machinery and equipment.

**Direction 3 to CMP Regulation 1,** June 25: Postponing until July 7 the date on which authorized controlled-materials orders will have preference over DO orders calling for delivery of steel, copper, or aluminum during September.

**Direction 3 to CMP Regulation 1,** June 25: Providing that no prime consumer of controlled materials may order more than 35 per cent of his quarterly allotment of steel, copper, or aluminum for delivery in any one month.

**Delegation 12,** June 26: Authorizing the Office of International Trade to make allotments of controlled materials for export.

**Schedule 8 to M-45,** June 26: Providing for the allocation of methyl chloride.

**M-71,** June 26: Providing priorities assistance to technical and scientific laboratories in the procurement of materials for important research projects.

**Directions to M-55A, M-60, and M-61,** June 28: To enable manufacturers of farm machinery, machine tools, and certain specified components to obtain materials while CMP operations are getting under way.

**Amendment to M-34,** June 28: Relaxing restrictions on the use of sole leather.

**M-47A,** July 1: Providing for overall control of the use of steel, copper, and aluminum in consumer durable goods through one comprehensive order.

# WATCHING WASHINGTON

**Bertram F. Linz**

## Maybe Next Time

PAD's strong protest against the Defense Production Administration's short third-quarter steel allocation isn't going to get any more steel for oil and gas operators during the next 3 months, but it may have considerable influence in getting a better break for the fourth quarter.

The reason why the industry can't get any more material this quarter is simple—there isn't any more steel to be given out. But Secretary Chapman's long letter of protest to the Defense Production Administration put on that agency the responsibility for any lack of oil that might result from the failure to provide vitally needed steel.

The changeover from DO-rating distribution to CMP has resulted in what one official calls "ordered confusion."

As CMP gets rolling, the situation will gradually clear up and the machinery will run better with Manly Fleischmann, head of the National Production Authority, also serving as head of DPA. Heretofore, DPA made the decisions, and NPA carried them out. Things were not always smooth between the two agencies. Now Fleischmann will be charged not only with programing and planning the production requirements of the defense program but also will direct implementation of those policies.

Meanwhile, Deputy Administrator Bruce K. Brown and his staff have worked up comprehensive figures on not only what the oil and gas industry will need in the way of steel in the fourth quarter but what the pipe mills will be able to produce. He will have some very strong arguments to present to DPA in support of his demand for a better deal.

## Belated Fruit

CMP went into effect this week but it will be 2 months before whatever benefits it may confer percolate down to oil and gas operators.

That is because of "lead time," the time which elapses before a steel mill can turn out goods ordered today because of other orders stacked up ahead. Currently, the mills are booked solid through August on orders placed under the old "DO" system, and it will be September before any CMP orders begin to move.

There isn't much chance that lead time will be cut down, but there are possibilities it may increase next winter if there is a shortage of scrap or fuel or an interruption of transportation.

Right now, when the mills should be piling up inventories of scrap against winter needs, they are drawing on what stocks they have. That is why the National Production Authority is pressing an industrial scrap drive.

Meanwhile, crops are beginning to move and there is every indication of a quick freight-car shortage, estimated by the Defense Transportation Administration as high as 50,000 cars. Cars that move crops move steel as well, and there aren't as many of them today as there were a year ago.

Finally, the natural-gas shortage which has hit the mills annually for the past few years probably will be as bad as ever, maybe worse, this winter. Mills will switch fuels, if necessary, but they will lose some production.

An adverse development in any of these three factors would cut steel production.

## Just One More Penny

The new tax bill passed by the House will give the Treasury an additional $223,000,000 a year from levies on oil, but Secretary John Snyder is far from satisfied.

Snyder thinks that gasoline ought to pay 3 cents a gallon, instead of the present 1½ cents or the 2 cents proposed by the House. The House rate would provide an additional $215,000,000 to $220,000,000 a year, diesel oil included. Snyder's proposal would bring in an additional $606,000,000 from gasoline alone.

The Treasury apparently believes that an increase in the tax on gasoline will result in reduced consumption, its estimate of the gain from a 100 per cent rise being less than 100 per cent by $19,000,000. This indicates a curtailment in consumption of around 120,000,000 bbl.

The House bill would provide an additional $203,800,000 from gasoline, $11,500,000 from diesel oil used for highway transportation, and $3,000,000 from extension of the tax on transportation to cover oil transported by companies in their own barges or tankers.

On only one front has Snyder admitted defeat. In urging the Senate finance committee to impose still higher taxes, he made no plea for reduction of percentage depletion.

# Fourth-Quarter Request

## PAD asking for 2,336,470 tons of steel; line pipe to be short because of limited mill production capacity

**Bertram F. Linz**

WASHINGTON.—A fourth-quarter allocation of 2,336,470 tons of steel, 24,884,000 lb. of copper and 1,229,000 lb. of aluminum is being sought by PAD, it was learned this week.

PAD's claim to the Defense Production Administration is, however, some 250,000 tons under actual needs, all in line pipe, but this material was not requested because there is little or no chance that production of line pipe can be increased during the quarter to either the 1950 or the required rate.

For the domestic industry, PAD is asking 1,973,845 tons of carbon steel, 162,559 tons of alloy and stainless steel, 17,429,000 lb. of copper and 974,000 lb. of aluminum. In addition, it is asking 634,082 tons of carbon and 12,854 tons of alloy and stainless steel, 146,936,000 lb. of copper and 226,000 lb. of aluminum for foreign operations, and 50,456 tons of carbon and 2,674 tons of stainless and alloy steel, 53,130,000 lb. of copper and 29,000 lb. of aluminum for Canada.

**Tubular goods.** — Tubular-goods requirements of the domestic industry for the fourth quarter will include 437,000 tons of oil-country goods and 1,132,940 tons of line pipe, a total of 1,569,940 tons. Foreign requirements will be 38,000 tons of oil-country goods and 50,033 tons of line pipe, a total of 88,033 tons, and Canada will need 15,000 tons of oil-country goods and 17,501 tons of line pipe, a total of 32,501 tons, and a grand total of 1,690,474 tons.

The line pipe requirements will include about 650,000 tons of 16-in. and larger out of a total of 1,200,474 tons.

**Basis for request.**—The requirements for domestic drilling and production operations and MRO are based on the 1951 program for drilling 43,400 wells for a total of 160,000,000 ft.

It is being impressed upon DPA officials that steel must be alloted to fully meet the estimate for oil-country tubular goods in the fourth quarter, if operators are to be prevented from prematurely abandoning producing wells in order to obtain second-hand casing and tubing.

The need for a full fourth-quarter allotment is emphasized by adverse developments affecting third-quarter material.

The first of these developments was the foreshortened allocation of 1,583,800 tons of steel, which represented only approximately 67 per cent of the programmed requirements, and only about 73 per cent of the amount actually used during the average 1950 quarter.

The second development was the inability to find steel mills, distributors, or warehouses that would accept rated orders for third-quarter delivery of the entire tonnage allotted, and it now seems likely it will not be possible to secure more than 85 per cent of the alloted tonnage.

Finally, purchase orders previously accepted by steel mills over a period of several years for third-quarter 1951 delivery have been set back on mill schedules, and the indicated slippage from the third to fourth quarters may be as much as 150,000 tons.

At the same time the Iranian situation has spotlighted the urgency of finding reserves and building up the production, refining and transportation capacities of both the United States and our allies as a guard against a possible emergency. Also, all types of demand are increasing steadily.

Heretofore, some domestic operators have been able to negotiate conversion deals or import steel to supplement the inadequate supplies provided through allotments, but under the full controlled-materials plan which will be effective with the fourth quarter conversion steel will no longer be available, and imported steel is expected to shrink in quantity and rise abnormally in price.

**Pipe-line construction.** — Because of the shortage of line pipe, only those new oil lines highly essential to the defense effort will be given allocations during the fourth quarter.

Among the facilities badly needed are two large-diameter lines from West Texas, the area on which major reliance is placed for increased production; a line under construction from Wyoming to Wood River, Ill., which requires considerable pipe for completion; an enlarged system to move Louisiana oil; 117 miles of pipe to extend the Ohio Oil Co. Wood River, Ill.-Sheridan line to Lima, Ohio; and replacement with large-diameter pipe of the Sinclair Pipe Line Co. system between Drumright, Okla., and East Chicago, Ill.

**Refining.** — The refining estimate is based on specific programs necessary to meet defense requirements, one covering special facilities for the production of products such as aviation alkylate, benzene, cracking catalysts, aromatics, etc., and the other for expansion in basic refining capacity.

**Natural gas.**—Requirements for natural gas production and processing have been held to the minimum, and line pipe requirements for gas transmission and distribution have been held to 609,500 tons, although requirements to complete existing projects alone are in excess of 1,000,000 tons.

**Foreign.**—The projects for which Canadian operators are asking steel will provide an increase of some 300,000,000 bbl. of new reserves annually which would be sufficient to support a production of 60,000 bbl. per day, and an increase of 85,000 bbl. per day

### New Producer in Old Field

**After 50 years of production, the famous Spindletop field of Texas is still making oil news. This gas-condensate producer recently opened a new pay sand on the northwest flank of the field, inside the city limits of Beaumont. The well (Prather No. 1) is owned by Meredith, Clegg & Hunt of Houston. Shown at the christmas tree are E. V. Metcalf, Gulf Coast Machine & Supply Co., and P. C. Hankamer, engineer for the well's owners.**

in processing capacity. Still further increases are necessary to meet demand, however, and the refining companies are being asked to set up additional expansions to help bridge the gap.

With respect to materials for foreign operation, any curtailment of steel will result in a serious situation. The 1951 drilling program of 2,435 wells will barely permit the industry to produce the oil which the world market requires under the approved program.

The foreign situation is complicated by the threat of interruption of supplies from Iran and other areas, which would throw tremendous burden upon the remainder of the industry, both with respect to furnishing additional supplies and the finding of additional tankers to move oil from more distant sources.

Of equally serious import, shortage of supply easily could cause a general weakening of the political position of our allies, while in the event of war the military demands on the industry would mount, and unless the foreign industry is prepared at the outset the prospects would be very grim.

## Materials Rules

### How to use new allotment number system explained

WASHINGTON.—Rules for the use of allotment numbers by oil and gas operators in the United States and Canada to procure controlled materials and fabricated items have been issued by the National Production Authority.

Under CMP operators will use the allotment number H-9 to obtain MRO material, H-2 to secure material for use in a production operation, and H-3 for material for use in a construction operation. These numbers will be used to secure delivery of controlled materials under the M-46 order and also materials which were not controlled but for which priorities assistance may be authorized.

To secure delivery of controlled material, the operator must designate on his delivery order the calendar quarter in which he has been authorized to accept delivery. Thus the symbol for use on delivery orders for MRO material for delivery in the fourth quarter of this year will read "H-9-4Q51."

To secure materials which are not controlled but for which priorities assistance may be authorized, the operator will use the rating "DO" plus the proper allotment number. Thus, for MRO material on which priorities assistance is authorized under M-46, the operator will identify the order as "DO-H-9," in place of the DO-97 symbol provided in Section 3 of the order.

For material which is not controlled but is for use in the production operation, formerly identified by the DO-48 symbol, the identification is "DO-H-2." For material not controlled for use in construction, the symbol "DO-H-1" will be used in place of DO-48.

**Other requirements unchanged.**—The change in symbols in no way modifies the other requirements of M-46. The operator may not use an allotment number for more than the quantity for which he has been authorized. It may be used only to get deliveries of controlled materials during the calendar quarter in which the operator has been authorized to accept it.

If, as to authorizations granted prior to the date of the rules, June 29, no calendar quarter has been specified, the operator may not use the allotment number for controlled materials until he has obtained specific authority from PAD to use it for deliveries during a particular quarter.

If an operator who has been granted an allotment and has used the allotment number for deliveries of controlled material during the third quarter does not receive the material in that quarter, his allotment and allotment number for the quarter expire. A revalidation of allotment and number must be secured from PAD before he may accept delivery of controlled materials bearing that allotment number in the fourth or any succeeding quarter.

Allotment numbers for controlled materials are not valid for deliveries from producers earlier than September 1951 and numbers, accordingly, should not be placed upon orders for controlled materials, even though rated, which are to be filled prior to September.

For material other than that to be obtained from controlled-materials producers the allotment number, together with the DO rating, may be placed upon orders for delivery prior to September.

## Chapman Encourages Units

WASHINGTON. — Unitization can make the scant supplies of steel for oil and gas operations go much further, Interior Secretary Oscar L. Chapman has reminded the industry.

Chapman made his suggestion for intensified unitization in noting that 20 years of experience with federally sponsored agreements has proven its value as a conservation device. He pointed out also that the states now are accepting unitization as a means of securing the maximum economic recovery of oil, Oklahoma in 1945 taking the lead in making it compulsory. This year, Arkansas adopted similar legislation.

Unitization as first proposed to the American Petroleum Institute in 1927 was not received kindly by the industry, Chapman said. However, Congress enacted trial legsilation authorizing unitization of federal lands in 1930 and the following year made it permanent law.

The first agreement was made in January 1931, and there are now 186 in effect, of which 181 cover 2,623,251 acres of public lands. These include 117 on which production has been discovered, and 5 on producing Indian-land units of 36,066 acres. All told, 371 unit agreements on public and Indian lands were made during the past 20 years, but 185 of them have been terminated.

## Prices Frozen

WASHINGTON. — An indefinite freeze on prices as of June 30 has been ordered by the Office of Price Stabilization as a result of the action of Congress granting a 31-day extension of the Defense Production Act with a prohibition against price roll-backs, while it works out new legislation.

The congressional action made it necessary for OPS to postpone indefinitely the effective dates for new price regulations applying, among other products, to petroleum products derived from crude oil or natural gas other than carbon black, certain chemicals, and manufactured specialty items like candies.

## Import Quotas Filled

WASHINGTON.—With the exception of Venezuela, all foreign oil-producing countries filled their quotas of imports into the United States within the first 5 months of the year.

Following termination of the Mexican reciprocal trade agreement last December the quota provisions of the agreement with Venezuela were revived, limiting 1951 imports at half the original import excise tax to 5 per cent of continental refinery output in 1950. The quota for the tax concession was placed at 4,399,220,700 gal.

By the first of June, Treasury figures show, Venezuela had shipped in 2,327,847,998 gal. of her quota of 2,613,137,096 gal. Netherlands had filled her quota of 822,654,271 gal., and the allocation of 963,429,333 gal. for all other countries, including the Middle East, also had been filled.

## PAD May Reschedule Orders

WASHINGTON.—The National Production Authority has authorized the Petroleum Administration for Defense to reschedule deliveries of controlled materials on order with mills.

Under the delegation, if PAD finds that an operator has a priority order in a mill for goods which he will not require during the month in which it is to be delivered, it may order the goods delivered to an operator in need of it. The first operator would then get his material at a subsequent date when he could make use of it.

# Tidelands Vote

## Quitclaim bill heads for expected House approval

WASHINGTON.—The long-stymied tidelands legislation was finally headed this week toward a vote in the House of Representatives.

A congressional decision on ownership of the California-Texas-Louisiana submerged oil lands was made possible by a resounding 18-6 vote in the House judiciary committee to report the Walter bill quitclaiming the tidelands to the states.

Before voting to send the Walter bill to the floor, the committee resoundingly voted down the Celler version of the O'Mahoney resolution for "interim" federal management. The O'Mahoney resolution, badly mutilated by amendments offered by Sen. Russell Long of Louisiana which would make it in effect a measure for interim management by the states, is still resting in the Senate Interior Affairs Committee.

Under the Walter bill, the seaward boundaries and ownership of the coastal states would be restored to their original lines of 3 miles generally and 10½ miles in the case of Texas, and all the federal Government would get out of that area would be first call on oil production in the event of an emergency. The Government would have the undisputed holding of the area from the state boundaries to the edge of the Continental Shelf, but the states would get 37½ per cent of any revenue.

Rep. Emanuel Celler, chairman of the House committee, who made a strong fight for interim federal management, has announced he will make one last effort in its behalf when the legislation comes up for debate. Celler will seek to have his measure substituted for the Walter bill, but has only a faint chance of accomplishing anything.

Once it gets to the floor, the bill is expected to pass the House easily. It may encounter rougher going in the Senate, but supporters of state ownership claim they can get it passed there, too. But it is headed for almost certain veto at the White House, and while a veto probably can be readily overridden by the House it will be difficult to get the necessary two-thirds vote in the Senate.

## Agencies Agree on Transport

WASHINGTON. — The Petroleum Administration for Defense and Defense Transportation Administration have agreed on the manner in which each will deal with transportation problems coming under its jurisdiction to prevent conflict of authority.

Under the agreement, PAD will collect and analyze data respecting domestic-oil-transportation requirements and keep DTA informed of transportation needs.

DTA, in turn, will keep PAD informed on the amount, type, and location of transportation facilities suited to and available for the movement of petroleum, and will consult with PAD on actions bearing on the petroleum-supply program.

PAD will formulate such plans and programs, and after consultation with DTA, will take such action as will assure the most efficient use by the industry of the transportation facilities available. DTA, again, will consult with PAD regarding the operation of facilities for the movement of oil and keep PAD informed of its plans and programs for providing additional facilities.

The arrangement gives PAD the right to make recommendations to the DTA for the allocation or reallocation of transportation facilities and for such priorities as may be necessary.

Before instituting any priority system of its devising DTA will consult with PAD regarding its effect on the petroleum supply program. PAD will keep DTA informed of its plans and programs for oil pipe lines and storage facilities.

The agreement does not call for the delegation of any authority by one agency to the other.

## Teis Succeeds Neptune

WASHINGTON. — Donald R. Teis, formerly materials supervisor for Creole Petroleum Corp. in Venezuela, was appointed assistant director of the PAD production division this week, succeeding Millard K. Neptune.

Neptune recently resigned to become president of Platte Pipeline Co.

Teis, whose home is in Watonga, Okla., served with the production division of PAW from 1942 to 1944.

Other appointments to posts in the production division this week were Robert V. Sellers, since last January connected with Cities Service Oil Co., Bartlesville, Okla., as technical assistant to the director; and John E. Buckley, formerly superintendent of operations for the Michigan district for Sohio Petroleum Co., Mount Pleasant, Mich.; Floyd Brett, formerly assistant general superintendent of the production department of Sinclair Oil & Gas Co., Tulsa; and Harrison T. Brundage, since 1948 a geologist with Stanolind Oil & Gas Co., at San Antonio, Tex., as staff members.

## Radio Rules Revised

WASHINGTON.—Over-all revision of the maritime radio-service rules has been completed by the Federal Communications Commission, Joseph E. Keller, special representative of the National Petroleum Radio Frequency Coordinating Association and the American Petroleum Institute central committee on radio facilities, reported last week.

An additional station classification, Marine Fixed, has been established to meet the communication needs of the petroleum industry engaged in offshore drilling. Stations will operate in the 2,100 to 2,210-kc. band and will communicate with public coast stations using telephony.

Keller announced that a plan for shutting down radio-location stations when their 1,750 to 1,800-kc. frequencies are required for Disaster Communications Service operation

## Officials at B-A Refinery Opening

**Among executives who attended the official opening of British American Oil Co., Ltd.'s, Edmonton refinery last week were, left to right: Robert E. Kepke, vice president of transportation and supply; R. H. C. Harrison; M. T. Stevens, refinery manager; E. C. Manning, premier, Province of Alberta; W. K. Whiteford, B-A president; and Hon. N. E. Tanner, minister of lands and mines for Alberta. The refinery is designed to process 5,200 bbl. of crude daily. (The Oil and Gas Journal, June 28, 1951, page 49).**

has been submitted to FCC Chairman Wayne Coy by the A.P.I. Both services would work on the same frequencies, and the plan is designed to eliminate interference by radiolocation operations in times of emergency.

The plan calls for the setting up of an intraservice liaison system by both services, each of which would regulate its own operations but would develop plans and techniques jointly. The initiation of a shut-down order in the event of an emergency would be the responsibility of the disaster service, while the responsibility for the actual prompt shut-down of radio-location stations would be lodged in the radio-location users.

## Refinery Certificates Issued

WASHINGTON. — Certificates for accelerated amortization of more than $40,000,000 of new oil facilities have been approved by the Defense Production Administration.

The largest of the recently issued certificates permits quick writeoff of 70 per cent of a $26,075,000 gasoline facility planned by Great Northern Oil Co., Dallas.

In Dallas a Great Northern official said negotiations of a crude supply are now under way. The refinery, he said, would not be built in Dallas, but he declined to reveal the proposed location.

Other certificates for accelerated amortization of 75 per cent of a $5,000,000 benzene and toluene plant for Atlantic Refining Co., Philadelphia; $2,907,000 motor-gasoline facilities for Acadia Corp., Shreveport; two projects, each not in excess of $250,000, for isobutane and butane production by Signal Oil & Gas Co., Los Angeles; and not exceeding $1,280,000 for natural-gasoline production by Standard Oil Co. (Tex.), Houston. A certificate covering 70 per cent of a $5,520,000 distillate fuel oil project also was granted Southwestern Oil & Refining Co., Corpus Christi, Tex.

Two 50 per cent certificates were granted for storage facilities, covering a $120,446 project of Shell Oil Co., and a $310,142 project by Esso Standard Oil Co., both at New York.

## Radio Construction O.K.'d

WASHINGTON. — The following construction permits for petroleum-radio service, covering 21 base stations, 28 mobile transmitters, and 41 relay units, have been issued by the Federal Communications Commission:

1. Texas-Illinois Natural Gas Pipeline Co., 20 relay transmitters, located 4 each at Hope and Okolona, Ark., and near Pinehill, Moscow, and Douglasville, Tex., to operate on the frequencies of 6,625, 6,685, 6,745, and 6,805 mc.

2. Standard Oil Co. of California, 2 base stations to operate on 158.37 mc. near Taft and at Pine Mountain in Ventura County, California.

3. O'Neal Drilling Co., Lubbock, Tex., received grants for 4 base stations at temporary locations in northwestern Texas and for 10 mobile units to operate on 48.98 mc.

4. Ohio Oil Co., 5 base stations at Berwick and temporary locations in the coastal areas of Louisiana and for 6 mobile units to operate on 25.26 mc.

5. Continental Pipe Line Co., for 2 mobile units operating on 33.38 mc. in south-central Texas.

6. Atlantic Refining Co., for 4 base stations to operate on 49.14 mc. at temporary locations in southwestern Texas and adjacent waters.

7. Texas Eastern Transmission Corp., for 21 relay transmitters to operate on 1,880, 1,930, and 1,980 mc., 3 each at Ackerman and Maben, Miss.; Boxas and Coker, Ala.; and Allison, Lafayette and Leoma, Tenn.

8. Superior Oil Co., for 6 base stations near Lake Arthur, La., and 10 mobile units, to operate on 25.30 mc.

## Oil-Tax Collections Up

WASHINGTON.—Treasury revenue from the three federal oil taxes for the first 11 months of the current fiscal year ran $62,000,000 ahead of those for the same period a year ago, Internal Revenue Bureau figures show.

Up to May 31, the bureau reported, collections included $516,668,549 from gasoline against $480,301,933 to the same date last year; $86,719,254 from lubricating oils against $66,617,988, and $23,104,440 from pipe-line transportation against $17,460,920.

Collections for the month of May brought in $45,329,920 from gasoline and against $45,336,535 for the same month last year, $5,881,711 from lubricating oils against $6,252,005, and $2,599,868 from pipe-line transportation against $1,533,953.

## Drums Allocated

WASHINGTON.—Manufacturers of 55-gal. steel drums have been directed by the National Production Authority to reserve 5 per cent of their total production between June 1 and September 30 for delivery to holders of validated export licenses for petroleum products.

The action was taken to meet urgent demands for shipping containers for overseas shipment of oil products, at the request of the Economic Cooperation Administration, State Department, Office of International Trade, and other agencies.

The directive is expected to make available approximately 125,000 drums each month, which will provide approximately one-eighth of the total number required monthly for the licensed export of petroleum products normally exported in drums.

# SOUTHWEST

## Mineral Rights Sold

WICHITA FALLS. — Mineral - fee title to approximately 38,500 acres of the L. F. Wilson Estate properties in North Central Archer County has been sold for a sum in excess of $5,000,000.

Purchaser is a group of corporations and individuals headed by Maracaibo Oil Co., New York, with offices in Dallas. Future management of the property will be conducted by Petrex Oil Corp., Houston.

There are now 680 producing wells on the property, royalty rights on which are covered by the sale.

## Major Discovery Indicated

HOUSTON.—A major oil discovery was indicated this week as Continental Oil Co. was completing its Shannon Ranch well 1-A in Crockett County, Texas, about 6 miles northeast of the well-known Todd Ranch field, and 15 miles northwest of Ozona, Tex.

The well is being completed at a depth of 7,236 ft. after a third drill-stem test from 7,185 to 7,236 ft. Previously it had showed oil from 7,100 to 7,150 ft. and from 7,151 to 7,181 ft.

The latest test had gas in 7 minutes, mud in 17 minutes, and oil in 22 minutes, and in the next hour 60 bbl. of 40°-gravity oil flowed through a ½-in. choke. Estimated gas rate is 1,360,000 cu. ft.

The zone of saturation, which is in the Ellenburger and probably in the third pay zone of the Todd Ranch pool, runs from 7,110 to 7,236 ft., or a total of 126 ft. of pay.

Continental's acreage totals 8,780 in the entire Shannon Ranch, with about 6,000 acres in one block surrounding this well.

# CANADA

## New Petrochemical Plant

MONTREAL.—Acetone and phenol will be the two principal petrochemicals to be synthesized in a new Montreal East plant to be built jointly by British American Oil Co., Ltd., and Shawinigan Chemicals, Ltd.

The joint venture, calling for erection of a $4,000,000 plant, will be administered by the newly formed British American-Shawinigan, Ltd., in which each of the two principals will own a 50 per cent share.

The plant is expected to be in operation by late 1952. Base stocks for the petrochemicals will consist of light hydrocarbons from the recently expanded, 32,000 bbl. per day refinery owned by British American.

Shell Oil Co. of Canada, Ltd., just a week earlier announced it will build a $3,000,000 petrochemical plant adjacent to its refinery at Montreal East to produce acetone and isopropyl alcohol from light hydrocarbons *(The Oil and Gas Journal, June 28, page 50)*.

A third plant will be erected at the refining center by Dominion Tar & Chemical Co., Ltd., which will utilize refinery gases from McColl-Frontenac Oil Co., Ltd.

*NIGHT AT ABADAN.—A portion of the world's biggest refinery, the 500,000-bbl. plant of Anglo-Iranian Oil Co., expropriated by the Iranian Government.*

# Abadan Halves Output

## Products going into storage as tanker captains refuse to sign receipts; little crude reaching outside world

A COMPLETE shutdown of Iranian oil operations appeared inevitable this week, barring some unexpected break in the deadlock caused by the refusal of both the British and Iranian governments to offer or accept any further concessions.

So far as the outside world is concerned, the operation is virtually closed down already. No products are leaving Abadan because the British have instructed tanker captains not to sign receipts saying that payment is due the new Iranian National Oil Co.

The Abadan refinery of Anglo-Iranian Oil Co., Ltd., was cut back to 45 per cent of its normal capacity this week as a result of the continued refusal of Iranian authorities to permit export shipments without receipts to the new government company.

The curtailment of the refinery operation was carried out July 1. In Abadan, K. B. Ross, Anglo-Iranian's refinery manager, said the plant is now producing 8,300,000 gal. daily (about 240,000 bbl.), compared with 15,000,000 gal. (430,000 bbl.) June 30, and a normal output of 18,000,000 gal. daily (515,000 bbl.).

The company official said there is enough storage in the area to permit continuing this reduced rate of production for about 20 days. If no settlement of the nationalization issue is made before the refinery is forced to shut down completely, presumably the British employes of the company will then be evacuated and the vast enterprise left to Iranians.

**Products lost.**—At the beginning of this week, no oil had left Abadan for 10 days. While the shortage of products that will inevitably develop probably will not be as sudden and severe as in the April shutdown of the Abadan refinery, a tightening of supplies throughout the Eastern Hemisphere is certain in the next few weeks.

Measures to minimize effects of the Abadan shutdown have already been worked out by British and American companies. These include stepping up refinery runs elsewhere, elimination of tanker crosshauls, and diversion of products to the worst affected areas. *(See National Affairs.)*

As a result of the refinery reductions, at Abadan crude production in each of Anglo-Iranian's five major fields was cut back correspondingly. As far as was known, exports of crude alone were continuing from Bandar Mashur, another loading port to the east of Abadan.

**Drake optimistic.**—Although the situation in Iran was still critical, there were some faint hopes for a settlement.

Eric Drake, general manager for Anglo-Iranian in Iran and Iraq, arriving in London for conference, said he viewed the situation with guarded optimism.

"I am not by any means depressed, and I think it will come out all right," he said. The company completed evacuation of women and children from Abadan late last week. They were brought out by air, and those arriving in London had been able to bring little if any of their personal belongings.

An initial evacuation of some of the British employes themselves was carried out when 140 persons reached Basrah in Iraq. The company had approximately 2,800 British employes in Iran.

**Board at odds.**—Dissension was reported among the Iranian officials appointed to the government's temporary oil-management board. These board members are now in Abadan, where they have issued various proclamations such as the one prohibiting export without receipts for payment later to the government. One member of the group declared there is yet some chance of a working arrangement with the British, while another asserted no compromise whatever was possible.

Outwardly, the aspect of the dispute that appeared most strange was the fact that the Iranian Government has not as yet stepped in and forcibly taken possession of the properties, installing its own managers and attempting to carry on the business.

This obviously indicates the Iranian Government had originally expected the company would acceed to its demands, continue production, and retain its employes in the country.

*IN THE FIELD.—This small distillation unit was built in Agha Jari oil field in South Iran to supply local needs. Multistage gas separators can be seen immediately above the column.*

# Unique Operations

## Field procedures in Iran don't follow generally accepted patterns, would pose problems for A.I.O.C.'s successors

THE fields and plants in Southwest Iran of Anglo-Iranian Oil Co., Ltd.—now claimed by National Oil Co. of Iran through expropriation—incorporate novel features which were developed by one of the oil industry's leading technical organizations to cope with unusual operating conditions.

The company over many years has perfected the methods required to carry on a successful operation centering in a British organization in Iran of more than 2,500 employes.

Visitors from the United States and other major oil centers are in agreement that continued operation requires special skills and experience in management which could not be acquired quickly by outsiders. It is pointed out in this connection that incompetent handling could quickly result in permanent damage to one of the world's largest oil reserves totaling approximately 12 billion barrels.

**Training schools.**—The company for years has conducted training schools for Iranians covering the practical phases of the operation. This includes courses for apprentices who have had meager grade-school education. If they complete their training, the trainees are qualified for routine operating positions in the fields, at the big Abadan refinery, and along the 1,000 miles of pipe line.

In addition the company operates a technical institute at Abadan for better-educated Iranians who are prepared to take advanced chemical and engineering courses applying to petroleum practices. The graduates of these courses and those from other universities within and without Iran can qualify for some of the company's key positions. The number, however, is wholly inadequate to take over any part of the large integrated operation. Common labor is almost exclusively Iranian.

**Producing operations.** — As summarized in the accompanying table, the producing operations are centered in seven fields with reservoir conditions not paralleled in any oil area outside the Middle East.

After the discovery of the Masjid-i-Sulaiman (MIS) field in 1908, the company conducted drilling operations for a time following the "American plan" with close spacing and a regular pattern.

Later, after the company had the organization and time to carry on geological and reservoir studies, there evolved an operating procedure which had no precedent in oil-field activities up to that time. These methods have been largely duplicated in other parts of the Middle East.

The producing formation in Iran is known as the Asmari limestone of the lower Miocene and upper Oligocene age. It is characterized by large area and great thickness. Masjid-i-Sulaiman comprises an area of 18 by 3½ miles with a producing column of approximately 1,000 ft. Formation thickness over the entire area ranges from 500 to 1,500 ft.

**Typical reservoir.**—A typical reservoir consists of a folded, massive, and well-fractured formation. The limestone is of low porosity, and production is only obtainable from fissures. These fissures are interconnected covering the entire formation and this had made possible the controlled practices first introduced in Iran.

The reservoirs take the form of an annulus with gas in the center and above the oil and with water on the outside and below it. Maximum recovery is accomplished by maintaining a horizontal gas-oil level and water-oil level throughout the reservoir.

Each reservoir has a gas-pressure indicator well and oil-water and oil-gas indicator wells. Gas pressure and water and oil levels are carefully checked from field laboratories to the end that the oil is recovered evenly throughout the formations.

Incompetent operation would be quickly reflected in water encroachment and other difficulties resulting in large losses to ultimate recoveries.

**Crude stabilization.**—The company has perfected a method of stabilizing the crude oil as it flows to common headers from the wells. This operation is automatically controlled, extending back to the rate of production from each well. Most of the gas from the stabilizers is reinjected, thus helping to maintain the balance upon which an entire field operation is based. Several pipe lines ranging in length up to 170 miles connect the fields with the refinery and a shipping terminal located on the Persian Gulf.

**Abadan refinery.**—The refinery at

**PRODUCING FIELDS IN IRAN**

| Field— | Daily output, 1950 bbl.† | No. of flowing wells | Depth, ft. | Accumulative output, bbl.* |
|---|---|---|---|---|
| Agha Jari | 350,000 | 15 | 6,000-9,000 | 300,000,000 |
| Gach Saran | 41,000 | 4 | 4,000-7,000 | 113,000,000 |
| Haft Kel | 190,000 | 20 | 3,000-4,000 | 932,000,000 |
| Lali | 16,000 | 4 | 6,000-9,000 | 845,000 |
| Masjid-i-Sulaiman | 52,000 | 30 | 2,000-3,000 | 849,000,000 |
| Naft-Safid | 33,000 | 5 | 5,000-6,000 | 28,000,000 |
| Naft-i-Shah | 11,000 | 4 | 2,600-3,000 | 47,000,000 |
| Totals | 693,000 | 82 | | 2,273,849,000 |

*July 1, 1950. †Production has exceeded 700,000 bbl. daily over part of the period since January 1, 1951.

Abadan on the Shatt-el-Arab River about 20 miles from the Persian Gulf is not only the world's largest refinery but in some respects the most complete. This year, up until the recent emergency, the refinery has processed in excess of 500,000 bbl. of crude oil daily.

The Iranian crudes are generally classed as "sour" owing to the sulfur compounds, and the operation has been adapted to these crudes at high processing costs. In general the processing equipment is American design with numerous installations by Badger, Foster-Wheeler, Kellogg, Alco, Lummus, and other American engineering companies. Much of the equipment and materials used in these installations are from American manufacturers. Most auxiliary equipment, including utilities, is from Great Britain and western Europe.

**Other activities.**—Because of the isolated location the refinery not only refines petroleum but it carries on many other activities. It supplies the utilities for Abadan's population of 100,000. It is a large manufacturer of sulfur used in field and refinery operations. Five sulfur dioxide plants are operated.

The refinery processing is installed and operated in the same manner that it would be in a modern large refinery in the United States. This requires skilled operators, most of whom are British, who have been at the refinery for many years. Iranians have been trained for some of the key positions and serve as helpers in many parts of the plant. The laboratory-control methods are among the features of the plant operation.

**Equipment.**—Indicating the size of the plant, part of the crude-oil processing takes place in four units each having a design capacity of approximately 85,000 bbl. daily. During World War II the refinery refined up to 13,000 bbl. daily of 100-octane or better aviation gasoline. This was done without the aid of catalytic cracking, which has since been installed.

Outstanding is the plant's fractionating equipment, consisting of many units which with isomerization and alkylation installations, enabled the plant management to reach its large production of aviation gasoline. The plant has large thermal cracking and polymerization capacity. The Iranian crudes are not readily adaptable to lubricating-oil manufacture, but a small plant has been installed since the close of World War II.

# Shell's 1950 Story

## Royal Dutch organization reports yearly average crude output of 1,000,000 bbl. daily, runs of 1,500,000 bbl.

WORLD-WIDE crude-oil production of the Royal Dutch-Shell organiation in 1950 averaged approximately 1,004,000 bbl. daily, and by the close of the year had risen to about 1,085,000 bbl. daily. In addition, crude received under long-term contract averaged nearly 240,000 bbl. daily.

During the year, crude and natural gasoline processed in refineries owned by the Royal Dutch-Shell Group and its associated companies approximated 1,250,000 bbl. daily, an increase of about 17 per cent over 1949. By the latter part of the year, the rate of throughput had reached nearly 1,500,000 bbl. daily.

Details of the operations of this vast international oil organization were disclosed in the annual reports of the two parent companies, Royal Dutch Petroleum Co. and Shell Transport & Trading Co.

Royal Dutch, headquartered at The Hague, has a 60 per cent interest, and Shell Transport & Trading, with offices in London, a 40 per cent interest in the three operating subsidiaries, N. V. De Bataafsche Petroleum Mij., Shell Petroleum Co., Ltd., and Anglo-Saxon Petroleum Co., Ltd. These in turn control the numerous other Shell companies operating throughout the world.

In the Shell Transport & Trading report, F. Godber, chairman of this company, pointed out that the oil industry is now producing at a rate of 12,000,000 bbl. daily, more than twice as much as in 1938, and said that the industry's task in meeting whatever rising demand the future may bring would be made all the easier if it were free from unnecessary restrictions imposed upon it. He said the agreements settling the dollar-sterling oil issue which were reached last year between major United States companies and the British Government were welcome. One result was the ending of gasoline rationing, but the Shell chairman said an important and even overriding factor in this was rapid progress in refining expansion which had been achieved by the British companies.

He paid tribute to the contribution made by British manufacturers of oil equipment to the solution of the problem of expanding oil demand and remarked that their increased production helped make possible the agreements under which the United States companies agreed to spend a large part of their earnings in the sterling area.

Accompanying the handsomely illustrated reports of the two parent companies was a survey of activities issued by Shell Transport & Trading. The following is a summary of some of the highlights. What is given below deals, in general, only with developments during 1950 which are less well known, at least in the United States:

**Exploration.**—As a result of exploration work carried out by the group and its associated companies during 1950, total estimated reserves of crude oil at the end of December were increased despite the higher level of production (no figures on reserves were given).

Shell's total holdings in western Canada were increased to about 7,750,000 acres, and the group obtained its first crude oil in northwest Alberta in a joint well. The report commented it is too early to assess the importance of the results so far achieved. The Shell company in the United States increased its exploration work during the year and discovered oil or gas in 52 of the 80 exploratory wells completed.

In Trinidad, some indications were obtained by United British Oilfields of Trinidad, Ltd., of oil possibilities in the Catshill area. As a result of rapid progress in field work in Tunisia on a concession shared with French partners, the site for the first test well was selected.

Geological work carried out jointly with others in the Somaliland Protectorate failed to justify continued activity. In Nigeria, geological and geophysical work in a joint venture was intensified. Preparations were made for an aerial survey and the site for the first well was selected.

Iraq Petroleum Co., Ltd.'s test well at Ain Zalah in the Mosul concession in Iraq revealed that deeper horizons were oil-bearing. In Qatar, step-out wells extended the producing area considerably to the south.

**Production.**—Total crude oil and natural gasoline available to the group amounting to 454,300,000 bbl. in 1950 was 85 per cent over that for 1946. The greater part of this huge increase in supplies was obtained from sources outside the United States.

In Venezuela, drilling was maintained at about the 1949 level, but preparations were made for a substantial increase in 1951. A greater proportion of effort was directed at building up the potential of fields producing heavy oil. Drilling by Anglo-Egyptian Oilfields, Ltd., in Egypt seemed to confirm that no substantial increase is likely in the reserves underlying the existing Sinai leases.

Production in Indonesia was gradually increased to about 82,000 bbl. daily. Conditions generally however remained unsettled and in some areas it was still not possible to resume operations.

**Manufacturing.**—During the year, all refineries of the group, with the nota-

ble exception of the Haifa plant in Israel, were operated at maximum capacity. Operations increased even more than indicated by comparison of intake figures, since distillation and other primary processes represent only part of the complex phases in the conversion of crude oil into the balanced output of finished products.

The new extension to the Montreal refinery was completed near the end of the year.

At Cardon, in Venezuela, completion of a second thermal cracking plant and modifications contributed to the higher level of throughput which at the end of the year was 71,500 bbl. daily.

Addition to the operating capacity of the group's refineries in the United Kingdom brought the rate of processing to some 108,000 bbl. daily by the latter part of the year.

At the Pernis refinery in the Netherlands, throughput had risen to more than 100,000 bbl. daily over the last few months of the year.

In France, capacity at Petit Couronne was increased by more than 10,000 bbl. daily. The crude intake of the three Shell-Berre refineries reached 74,000 bbl. daily late in the year. At La Spezia in Italy, the refinery is now capable of processing 14,000 bbl.

At Balik Papan, in Borneo, the first new distillation unit was brought into operation, and auxiliaries systematically extended, enabling a throughput of about 25,000 bbl. daily the latter months of the year. At Pladju in southern Sumatra a large solvent treatment plant for the manufacture of components for aviation gasoline was completed. Restoration work continued at Tjepu, in Java, and a distillation unit was brought back in operation in November.

**Transportation.**—Tanker tonnage controlled and period chartered by the group markedly increased in 1950. By the end of the year this amounted to some 5,250,000 dwt., of which some 2,250,000 was owned by the group and Eagle Oil & Shipping Co., Ltd.

## International Briefs

**Pantepec Oil Co. has completed its** RPN 27, a semiwildcat in the company's El Roble concession. The well flowed 55 -gravity oil at a rate of 600 bbl. daily on a test using a ½-in. choke.

**Negotiations between West German** and United States industry representatives over possible export of benzol to the United States continue to drag. The Germans are not eager to export benzol, also scarce in West Germany, unless they receive some substitute such as lead fluid for upgrading motor fuel. Between 120,000 and 130,000 tons of benzol annually are now used in producing high-octane gasoline in West Germany.

## FAR EAST

## India Eyes Synthetics

### State asks estimates on coal-to-liquid fuel plant

CONSTRUCTION of a synthesis plant which would convert coal into liquid fuels continues to interest the government of India.

Koppers, Inc., has given the government a supplementary estimate on such a project. Also under review are proposals from the European firm, Ruhr-Chemie-Lurgi, and M. W. Kellogg. Kellogg has submitted a plan for a petroleum refinery.

After devaluation of the rupee in September 1949, the government asked Koppers to made a supplementary estimate on facilities for producing 70,000 long tons of aviation fuel, 500,000 tons of soft coke, and such other products as would make the plant a commercial operation with a minimum capital expenditure. The government also suggested that because of foreign-exchange difficulties the process should be modified so that most equipment could be obtained from Europe.

**Cost: $44,000,000.** — Koppers placed cost of the project at about $44,000,000, exclusive of their fees for engineering and erection. The coal-to-oil plant is designed to yield annually 70,000 tons of aviation fuel, 500,000 tons of soft domestic coke, 28,000 tons of motor fuel, and 1,800 tons of refined phenol.

About 60 per cent of the capital cost would have to be incurred in Europe, 9 per cent in the United States, and 25 per cent in India. If refractories could be manufactured locally, expenditure in India may increase to 33 per cent and those in Europe correspondingly reduced.

If the project proves a commercial success, it can be expanded by investing another $23,000,000 to yield: 100,000 tons aviation fuel, 1,000,000 tons of soft coke, 85,000 tons of motor fuel, and 3,600 tons of refined phenols. It is estimated that profit from the operation of this enlarged plant would increase to $6,300,000 annually.

The Ruhr-Chemie-Lurgi proposal under review calls for manufacturing 68,750 tons of aviation fuel, 45,980 tons of motor fuel, 15,840 tons of diesel oil. Capital outlay would be $58,000,000.

**Kellogg project.**—The Kellogg project as reported provides for a refinery at Bombay to produce a million tons a year of various refined products, or about 20,000 bbl. daily. Imported crude oil would be used; capital cost of the plant would be $20,800,000.

India's production, slightly less than 5,000 bbl. daily in 1950, meets only a small part of the country's requirements. The synthesis and refinery projects under study are in line with the general aim of countries throughout the world for self-sufficiency in petroleum to reduce the foreign-exchange drain and to provide a more assured supply in case of war.

During the fiscal year ended March 31, 1950, India imported 22,056,000 bbl. of products (or slightly more than 60,000 bbl. daily). Of this, 14,316,000 bbl. came from Iran. In that 12-month period India imported more kerosine (5,680,000 bbl.) than it did gasoline (5,069,000 bbl.). Major product imported was fuel oils, amounting to 9,667,000 bbl. By comparison, India's oil imports in the 1948-49 year were only 14,616,000 bbl.

**African plant.**—The Union of South Africa recently announced plans for the construction of a coal-to-oil synthesis plant. M. W. Kellogg has the contract. Such a project has been under discussion in the country for years.

Last February, Standard - Vacuum Oil Co. announced plans to construct a new 10,000 bbl. daily refinery at Durban which will use imported crude.

## AFRICA

### New Congo Products Line

Constructior work is expected to start in November on a new modern products pipe line which will extend approximately 250 miles from Ango-Ango to Leopoldville in the Belgian Congo.

Four large companies marketing in the Belgian Congo, Socony-Vacuum Oil Co., Inc., The Texas Co., Royal Dutch-Shell, and Petrofina, undertook the project at the request of the Belgian Government.

The 6-in. line will be built by Belgian contractors using European pipe. Only a small quantity of specialty equipment will be bought in the United States. Completion is expected a year after work begins.

The four companies will form a joint subsidiary to carry out construction and operation. Initially there will be two pump stations, one at Ango-Ango, about 35 miles inland from the Atlantic coast, and another about half way to Leopoldville. The line will run parallel to the Congo River. Total cost will be between $4,000,000 and $5,000,000.

The pipe line will relieve dependence on the existing railroad for movement of light products, since the river is not navigable.

Leopoldville is considered to be the most modern city in West Africa with a population of more than 135,000. The terminus of the new line will serve not only the Leopoldville area but the territory supplied by river barge hundreds of miles upstream.

# HEART BLOW

## for a Cooling Tower

**Report on FUNGI DETERIORATION**

Results of field and laboratory research on fungi deterioration in cooling tower lumber have been compiled in a technical report, now available, without obligation, from Nalco. Report includes data on investigational findings, control and prevention methods, evaluation of results, and types of treatment. Ask your Nalco Representative for a copy, or write direct.

WHEN the ice pick plunges through a structural member as though it were paper, fungi deterioration has struck a heart blow at another cooling tower. Yet, if the infection has not brought about actual lumber collapse, there is a good chance Nalco can save the tower.

Basic Nalco 33 and 21-S treatment for recirculating cooling water systems prevents scale, corrosion, and delignification; effectively controls slime and algae. It will also *stop* fungi deterioration when chemical dosages are adjusted for this purpose.

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# PERSONALS

## Takes Up New Duties

### Don Miller is now head of Phillips' Midland office

DON A. MILLER, formerly manager of Phillips Petroleum Co.'s western division, has taken up his new duties as head of the new West Texas-New Mexico regional office at Midland, Tex.

With Phillips the past 17 years, Miller began his work in the oil business during summer months while still in school. Following graduation from Wisconsin School of Mines, where he received a bachelor of science degree in mining engineering; and University of Pittsburgh, where he received a B.S. in petroleum engineering, Miller began working with Phillips in 1934 as a roustabout at Jal, N. M.

During his career with Phillips he has served as mud engineer at Fittstown, Okla.; lease foreman at Borger, Tex.; assistant superintendent at Oklahoma City; superintendent of the Perry, Okla., district; and superintendent of the West Edmond, Okla., district.

Miller was named division superintendent at Amarillo in 1946, and later that year became superintendent of the Western division. He is a past chairman of the Permian Basin Chapter, American Petroleum Institute; a member of Texas Mid-Continent Oil and Gas Association, New Mexico Oil and Gas Association, and Independent Petroleum Association of America.

**E. R. Wilkinson,** assistant head of Esso Standard Oil Co.'s maintenance and construction department at the Baton Rouge, La., refinery, has been transferred to the Bayway, N. J.. refinery and will be responsible for Bayway's engineering and metal-inspection activities. **J. F. Wright,** head of the process-engineering department in Baton Rouge, has also been transferred to the Bayway refinery where he will head the technical division, responsible for the refinery's operations analysis, cost analysis, and laboratory activities. **G. T. Piercy,** assistant manager of the refinery crude and marketing department at Baton Rouge, has been transferred to the firm's offices in New York as assistant coordinator of refining operations. Rotational assignments also announced include: **J. R. Vannoy,** named assistant head of the maintenance and construction department, succeeding Wilkinson; **O. R. Menton,** named assistant head of maintenance and construction, succeeding Vannoy; **C. R. Draughon, Jr.,** appointed head of the stores department, replacing Menton; **R. W. Williams,** given charge of the equipment-inspection department, succeeding Draughon; **D. M. Cox,** former head of the process-design group in the process engineering department, moved up to assistant department head, replacing Williams; **J. E. Wood,** former coordinator of contracts in the refinery crude and marketing department, named head of the process-engineering department, replacing Wright; **P. G. Slachman,** former head of the cost-analysis department, named to replace Piercy as assistant manager of refinery crude and marketing; **M. H. Grosz,** former assistant head of the yield and cost department, named to replace Slachman; and **W. W. Hannaman,** recently on a special assignment with the process engineers, appointed yield and cost assistant head, replacing Grosz.

**William J. Kemnitzer,** consulting geologist of Lima, Peru, is now in the United States, and is presently located in Santa Ana, Calif. He has just completed a 3-month survey of the petroleum situation in Bolivia.

**R. I. Williams** has been appointed assistant general superintendent of crude-oil production for Lion Oil Co. and **A. W. Wood,** formerly with the production department of Phillips Petroleum Co., has been named to fill the post as superintendent of the southern division vacated by Williams. Williams for the past 13 years has been in Lion's production department.

**R. M. Wilson** has been named division geologist for Ohio Oil Co. at Shreveport, succeeding **C. L. Moody,** who has been named research geologist and transferred to the staff of the chief geologist. Moody will continue his office in Shreveport. Wilson has been acting chief geologist since February 1950, being appointed to succeed Moody, who was given a leave of absence to serve as president of American Association of Petoleum Geologists.

**B. Otha Dickerson,** gas engineer with the Shreveport conservation district for the past 10 years, has resigned to become chief analyst of the chemical and fuel division for the Shreveport Office of Price Stabilization.

**Forrest A. Hewitt,** geologist for Arkansas Fuel Oil Co. at Jackson, Miss., has been moved to Shreveport in that capacity. **William W. Gardner,** a 1949 Texas A. & M. College graduate in petroleum engineering, has joined the firm as a measurement engineer for the natural-gasoline division; and **William Albert Ruoff** has been promoted from roustabout to junior geologist.

**Malcolm Kemp** has been named geologist with Phillips Petroleum Co. at Shreveport. He formerly was with Tennessee Geological Survey.

**W. A. Long, Jr.,** has been transferred by Gulf Refining Co. from Jackson, Miss., to Shreveport as a geological scout.

**A. G. McNeese, Jr.,** formerly general counsel, vice president, and director of the McCarthy Oil & Gas Corp., and other McCarthy interests, Houston, has joined Houston Oil Co. of Texas and its subsidiaries as administrative assistant to the president.

**W. H. (Dub) Newman** has been named scout with Sunray Oil Corp. at Shreveport. He formerly served as geological scout for Magnolia Petroleum Co. at Edna, Tex.

**J. W. Ernste** has been named manager of the Rotterdam-Pernis refinery of N. V. de Bataafsche Petroleum Mij., succeeding **H. H. Buss.**

**Dr. H. Hoog** has been appointed director of process research and development of the Royal Dutch-Shell Laboratory, Amsterdam, succeeding **Dr. J. C. Vlugter.**

**Leslie C. Board, Jr.,** assistant director of Socony-Vacuum Laboratories, New York, was elected vice president of the American Society for Testing Materials at its fifty-fourth annual meeting in Atlantic City last week. **Thomas G. Delbridge,** retired, formerly manager of Atlantic Refining Co.'s research and development department, Philadelphia, was one of five prominent members of A.S.T.M. who were awarded certificates of honorary membership. Delbridge was president of the society in 1938-39.

# PERSONALS

**F. J. Hopwood,** a managing director of Shell Petroleum Co., Anglo-Saxon Petroleum Co., and the N. V. de Bataafsche Petroleum Mij., and a director of Shell Transport & Trading Co., has been appointed a managing director of the latter company.

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**A. J. Singleton,** vice president of California Texas Oil Co., Ltd., has been elected to the board of directors of the company and of Bahrein Petroleum Co., Ltd. A native of Ireland, Singleton was a director of the Petroleum Board in England during World War II. He has been engaged in the oil industry since 1924.

**Clive M. Alexander,** Louisville, Ky., has been elected executive vice president of Aetna Oil Co. Prior to the merger of Aetna with Ashland Oil & Refining Co., he had been vice president in charge of manufacturing and transportation.

**Eugene D. Milener** has been named secretary to the natural-gas and manufactured-gas departments of American Gas Association, New York. **George H. Smith,** who will continue as director of the natural-gas department, will move from New York to Washington to manage the association's new office in the capital. **Thomas Lee Robey,** secretary of the association's general - research - planning committee has been given the added duties of coordinator of research. **Roy A. Siskin,** formerly with the A.G.A. Laboratories, Cleveland, will assist Robey as research engineer.

**H. W. Ward** has been named technical assistant to the supervisor of the lubricating - oil - compounding and grease blending department at Tide Water Associated Oil Co.'s Bayonne, N. J., refinery.

**Dewey J. Sabin** has been named superintendent of the natural-gas and gasoline division of Sohio Petroleum Co., Cleveland. **Melvin Jorgenson** has been transferred from West Edmond, Okla., to Abilene, Tex., as senior petroleum engineer.

**Leonard Sinclair** has been elected chairman and managing director of Esso Petroleum Co., Ltd., London. A director since 1943 and managing director since 1949, he was elected chairman by the company directors to succeed the late R. A. Carder. **W. E. Jenkins** and **N. F. Myers** have been appointed managing directors, and **H. C. Tett** has been named a director of the company, formerly known as Anglo-American Oil Co., Ltd.

**J. Stanford Setchell** has been appointed secretary of the operating section, American Gas Association, New York City.

**Leslie M. Cochran,** superintendent for Great Lakes Refining Co. at Blue Island, Ill., has joined Uinta Oil Refining Co. as superintendent at Vernal, Utah.

**Rolla B. Trask,** head roustabout of the production department for Stanolind Oil & Gas Co. at Rangely, Colo., has been transferred to Sundown, Tex., in the same capacity.

**H. J. Ritts, Jr.,** formerly engineer at Sand Hills field for Gulf Oil Corp., Crane, Tex., has become assistant general manager of Intercoast Petroleum Corp., Midland, Tex.

**Lee Cludder,** geological scout for Gulf Refining Co. at Mount Vernon, Ill., has been transferred to Durango, Colo., as geologist. **Chan Carter** has been transferred to Mount Vernon from Evansville to replace Cludder, and **R. W. Schweigert,** who has been with the company in Canada, has returned to Evansville as scout.

**Jack H. New** has joined Humble Oil & Refining Co. at Overton, Tex., as a junior petroleum engineer.

**D. R. Staples,** special-projects engineer at Alice, Tex., for The Texas Co., has been named district petroleum engineer there.

**W. H. Thams** and **R. H. Frizzell, Jr.,** have resigned from the Midland, Tex., division headquarters of Anderson-Prichard Oil Corp., and will be associated together as independent oil operators. Thams has been division manager and head of the division geological department of Apco, and Frizzell has been division landman. **Kenneth C. Anderson,** a member of Apco's geological staff in Midland, has been named division manager succeeding Thams.

**William J. Mannas,** petroleum engineer for Pure Oil Co. at Chicago, has been moved to Fort Worth in the same capacity.

**Chester F. Dolley,** president, Atlantic Refining Co., has been elected chairman of the Conservation Committee of California Oil Producers. Other officers named were: **M. T. Miller,** Standard Oil Co. of California, first vice chairman; **J. L. Stephens,** Chanslor-Canfield Midway Oil Co., second vice chairman; and **L. W. Chasteen,** Union Oil Co. of California.

**O. E. Van Meter, Jr.,** reservoir engineer at Midland, Tex., for Magnolia Petroleum Co., has been transferred to Houston as assistant division engineer.

**Earle McIlroy,** formerly refinery superintendent for Johnson Oil Supply Co., Gary, Ind., has been named manager of Ruby Propane Gas Co., Altamont, Ill.

**Robert L. Maby, Jr.,** geologist at Seminole, Okla., for Mid-Continent Petroleum Corp., has been transferred to Oklahoma City in the same capacity.

**Frank W. Thompson** has been elected vice president of American Natural Gas Service Co., Michigan Consolidated Gas Co., and Michigan - Wisconsin Pipe Line Co., Detroit. A graduate mechanical engineer, Thompson has had wide experience in production and processing of natural gas in the field, and has been employed as an engineer by three regulatory commissions, the California and Michigan Public Service Commissions, and the Federal Power Commission. Following graduation from California Institute of Technology in 1929 with a B.S. degree in mechanical engineering, he joined Standard Oil Co. of California. He later worked for General Petroleum Corp. and Los Angeles Gas & Electric Corp.

**J. E. Stephens,** tool pusher at Cushing, Okla., for Delaney Drilling Co., is now located at Shawnee, Okla., in the same capacity.

**Charles H. Shinn,** formerly contract engineer at Tulsa for Stanolind Oil & Gas Co., has been transferred to Houston as senior gas engineer.

**D. E. Hughes,** independent oil operator, San Antonio, is now in Abilene, Tex., where he is drilling wildcat wells.

**Franklin G. Pardee** has been named state geologist by the Michigan Conservation Commission, succeeding **Gerald E. Eddy,** who was recently named director of conservation to fill the vacancy caused by the death of P. F. Hoffmaster. Pardee has been with the Conservation Department for 28 years, and more recently has been state mining engineer and geologist. He is a graduate of University of Wisconsin. **Wayland Osgood,** secretary of the commission since 1936,

# PERSONALS

has been named deputy director of the department. **Frederick P. Struisaker**, now chief of the lands division, was named secretary to succeed Osgood; and **Charles E. Millar** was named successor to Struisaker as head of the lands division.

**J. W. Hudson**, Tulsa, has been appointed general superintendent of Deep Rock Oil Corp.'s crude-oil production, filling the position vacated by **Carl A. Hoxy**, production vice president. Hudson is a graduate of University of Texas and prior to joining Deep Rock was with Republic Natural Gas Co.

**W. T. Harlan**, formerly a student at University of Houston, has joined Stanolind Oil & Gas Co. as a junior engineer in the Luby, Tex., area near Corpus Christi.

**H. M. Krause**, formerly assistant division petroleum engineer in Louisiana for Humble Oil & Refining Co., New Orleans, has been transferred to Houston as petroleum engineer for the Gulf Coast division.

**M. J. Heald**, manager of the Oklahoma division, producing department, The Texas Co., relinquished his responsibilities on July 1 and will now be available only in a consulting capacity. **Mark L. Terry**, assistant division manager, has succeeded Heald in the division managership in Tulsa. Heald, a veteran of more than 40 years in the oil business, in 1917 became superintendent of production for Texhoma Oil Corp. He operated as a drilling contractor from 1922-25, and joined Texas Production Co. (Colorado), a Texaco subsidiary, in 1927. He served as division manager for Oklahoma since 1946. Terry has been with Texaco since 1929.

**Dick Gangwer**, Evansville, Ind., has moved to Fort Morgan, Colo., to open offices for R. C. Gangwer & Co., drilling contractors and independent operators.

**George H. Smith**, Port Colborne, Ont., has been reelected president of the Natural Gas and Petroleum Association of Canada. Others elected include: **C. N. Glenny**, Fort Erie, Ont., past president; **S. B. Severson**, Buffalo, N. Y., first vice president; **J. B. McNary**, Hamilton, Ont., second vice president; **L. B. Mehlenbacher**, Cayuga, N. Y., treasurer; **Joseph McKee**, Hamilton, Ont., secretary and assistant treasurer, and **S. C. Hanna**, Hamilton, assistant secretary. Directors are: **Frank D. Howell**, Brantford, Ont.; **J. M. Moffat**, Weston, Ont.; and **T. Weir**, **S. A. Morse**, and **L. G. O'Connor**, all of Chatham, Ont.

**John Carrier**, formerly with Skelly Oil Co. at Wichita and later with Superior Oil Co. in the Illinois Basin area, has been named division geologist for Superior at Casper, Wyo.

**Bill Holcomb**, recent graduate of Texas A. & M. College, has joined Standard Oil Co. of Texas at Iraan, Tex., as petroleum engineer.

O. P. PURYEAR

**O. P. Puryear**, formerly supervisor of the grease-research department at the Beacon, N. Y., laboratories of The Texas Co., has been appointed assistant to the director of technical services by **Dr. W. E. Kuhn**, manager of the technical and research division.

**Donald K. Mackey**, senior geologist with the Arkansas Oil and Gas Commission, has resigned to join the Federal Power Commission in Washington, D. C.

**Pierre LaFleshe**, veteran conservation officer for the State of Wyoming, has resigned to become an independent oil operator. He has been succeeded by **Kenneth G. Lloyd**.

**Arnold Hois**, formerly exploration engineer for the Shell Group in Maracaibo, Venezuela, has moved to the regional office of Shell Oil Co. in Houston as reservoir and exploitation engineer.

**D. A. Yount**, general manager of the Latin America Southern division, Socony-Vacuum Oil Co., Inc., is being transferred permanently from company headquarters in New York City to San Paulo, Brazil. Direction of the company's Latin Northern, Ultragaz, and Ligasco divisions will continue to be handled in New York City by **J. H. Sibley**. **Burtill A. Peterson**, senior technologist at the technical-service department at Socony-Vacuum Laboratories, Brooklyn, has been transferred to Franklin, Pa., as chief chemist of Socony-Vacuum Oil Co., Inc.'s grease-manufacturing plant. He succeeds **Albert Ogden**, who resigned. Other changes include: **Carlton H. DuBois**, promoted from assistant plant engineer to superintendent of maintenance at the company's Atlas Works, Buffalo; **Emerson McElhaney**, White Eagle pipe-line division, Kansas City, Mo., given a temporary assignment with Petro-Congo, which is laying a pipe line in the Belgian Congo, West Africa; **Peter B. McCaughna**, leaderman mechanic, promoted to instrument engineer at Socony's Trenton, Mich., refinery; **T. C. Lockhart**, Paulsboro, N. J., refinery, named assistant superintendent of the light-products division; **E. L. Tullman**, appointed assistant superintendent of the packaging division; **J. K. Kelsey** is now assistant superintendent on special assignments; and **H. L. Daniels** is now power engineer in the refinery's power division.

**H. D. Jones**, formerly with Sunray Oil Corp. at Lewisville, Ark., is now production superintendent for McDermott-Barnhart at Sterling, Colo.

**Joseph C. Gordon, Jr.**, Magnolia Petroleum Co., Beaumont, Tex., has been transferred to Vanderbilt, Tex., as petroleum engineer.

**Jerral W. Gaither**, seismic-party chief for Atlantic Refining Co. at Magnolia, Ark., has moved to Center, Tex., in that capacity.

**John M. Sweeney**, production foreman for Sun Oil Co. at Brookhaven, Miss., has been transferred to Forsan, Tex., in the same capacity.

**W. T. Kennedy**, formerly district superintendent of production for Ohio Oil Co. at Haynesville, La., has been named assistant to the general superintendent of production at Findlay.

**Edward B. Marsh**, for 13 years hearing examiner for the Federal Power Commission, has been named Washington, D. C., representative of Transcontinental Gas Pipe Line Corp., Houston.

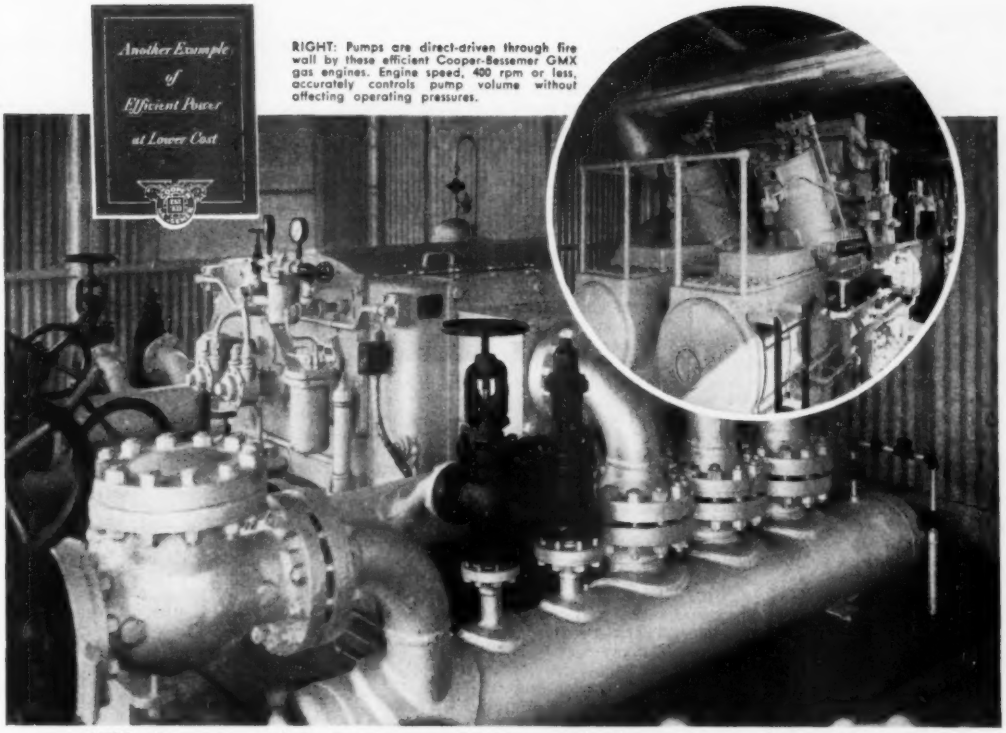
**Clyde Williams**, director of Battelle Institute, Columbus, Ohio, has been presented a doctor of science degree by Ohio State University.

**Floyd Brett**, Tulsa, assistant general superintendent, production department, Sinclair Oil & Gas Co., has been granted a 6 to 9 weeks' leave of absence to go to Washington, D. C., as assistant and consultant on the staff of the director of production, Petroleum Administration for Defense. **W. T. Crandall**, division superintendent, Fort Worth, will assume Brett's duties as acting assistant general superintendent in Tulsa.

**Don B. Beecher**, Kentucky-West Virginia Gas Co., Ashland, Ky., was elected vice president of the Kentucky Oil and Gas Association at the annual meeting in Ashland last week, succeeding **P. C. Van Gilst**, independent producer, of Ashland. Officers reelected were: president, **J. T. Diederich**, independent producer, Ashland; vice presidents, **G. M. Powers**, Bedrock Petroleum Co., Huntington.

*Another Example of Efficient Power at Lower Cost*

RIGHT: Pumps are direct-driven through fire wall by these efficient Cooper-Bessemer GMX gas engines. Engine speed, 400 rpm or less, accurately controls pump volume without affecting operating pressures.



ABOVE: One of two 6-cylinder Cooper-Bessemer Twin-Line pumps handling lean oil for methanizing and high pressure absorbing at Sun Oil's Starr County Gasoline Plant.

# Starring in **LOW-COST DOUBLE DUTY** ... at Sun Oil's Starr County Gasoline Plant

Maybe you can pick up a money-saving idea from this unusual pumping operation. Here, Sun Oil wisely took advantage of the flexibility of Cooper-Bessemer Twin-Line pumps to deliver lean oil at two different pressures simultaneously . . . for methanizing and for high pressure absorbing.

Because Twin-Line pumps have two banks of opposed cylinders, because they permit extreme flexibility and hold high efficiencies despite wide variations in demand, they are performing this double service with exceptional economy.

The pump shown opposite is one of two now in Sun Oil's service. The high pressure side of each delivers 248 gpm at 1100 psi. The low pressure side, or first stage, has a capacity of 388 gpm at 225 psi, the excess going to the low pressure demanthanizer. Each pump is direct-driven by a Cooper-Bessemer GMX gas engine at 400 rpm, or less, eliminating all need for gearing. Volumes are accurately controlled by varying engine speeds without affecting the operating pressures.

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# PERSONALS

W. Va.; **Karl Z. Wilking,** R. E. Hupp et al, Owensboro, Ky.; and **F. J. Zogg,** Randolph-Zogg Supply Co., Owensboro; secretary, **E. L. McDonald,** independent producer, Lexington, Ky.; and executive secretary and treasurer, **J. C. Preston,** Owensboro.

**Ward Langstroth,** for 2 years with The Texas Co. in the Arbuckle Mountain region of southern Oklahoma, has been named a geophysicist for Carter Oil Co. at Shreveport.

**Frank C. Pfeiffer, Jr.,** formerly engineer trainee at Lake Charles, La., for Magnolia Petroleum Co., has been moved to Brownfield, Tex., as gas engineer. **Asa D. McRae,** geologist at Morgan City, La., has been transferred to Lake Charles.

**Dr. L. F. Athy,** manager of the geophysical department of Continental Oil Co., Houston, has been promoted to manager of the newly created exploration department. Other changes include: **J. A. Culbertson,** chief geologist, named assistant manager of the geological section; and **H. R. Prescott,** assistant geophysical-department manager, named manager of the geophysical section.

**J. S. Welboan, Jr.,** has been promoted to assistant to the division manager of the geophysical division, producing department, The Texas Co., Houston. He is a native of Freeport, Tex., and is a graduate of University of Oklahoma with a B.S. degree in petroleum engineering. Welboan formerly was a geophysical-party chief.

**W. Baxter Boyd,** formerly area geologist in Fort Worth for Continental Oil Co., has been appointed manager of exploration for Republic Natural Gas Co., Dallas. He is a graduate of University of Oklahoma. **J. H. Hester,** formerly drilling superintendent of Republic, has been named general superintendent; and **C. C. Book,** district superintendent in Oklahoma, has been transferred to Dallas as assistant to Hester.

**Fred S. Burroughs,** Lake Mohawk, Sparta, N. J., has been appointed national secretary of the distribution division of Oil-Heat Institute of America, Inc., New York City.

**B. F. Wingrove** and **S. W. Thompson,** of the Paulsboro, N. J., refinery of Socony-Vacuum Oil Co., Inc., have been promoted. Wingrove was named operating department superintendent, and Thompson, supervisor in the package division, became assistant superintendent of the lubricating-oil division of the operating department. Wingrove succeeds **R. M. Chesney,** now manager of Deep Rock Oil Corp.'s Cushing, Okla., refinery.

**Reginald J. S. Pigott,** director of the engineering division of Gulf Research & Development Co., Pittsburgh, has been nominated as 1952 president of American Society of Mechanical Engineers. Since he is the only nominee, his nomination is tantamount to election. Pigott has been director of the engineering division of Gulf Research since 1929, and has spent 18 years in petroleum - engineering research. He holds more than 30 patents on devices used in hydraulic engineering, heating, oil production, and instruments. Other officers and directors, whose nominations were tantamount to election, are: Regional vice presidents, **Willis Frederick Thompson,** chief mechanical engineer, Westcott & Mapes, Inc., New Haven, Conn.; **Ernest Henry Hanhart,** consulting mechanical engineer, Baltimore; **Ernest Stephen Theiss,** assistant chief engineer, Davey Compressor Co., Kent, Ohio; **Samuel H. Graf,** renominated, director, Engineering Experimental Station, Oregon State College, Corvallis; directors-at-large: **Albert Carl Pasini,** superintendent, production department, Detroit Edison Co., Detroit; and **Paul B. Eaton,** head, mechanical-engineering department, Lafayette College, Easton, Pa.

*R. J. S. PIGOTT*

**L. G. Ayres,** geologist with Petersen Drilling Co., has been transferred from Jackson, Miss., to Shreveport.

**John Harbaugh,** of Hudson, Ohio, has joined the geological staff of Carter Oil Co. at Shreveport. He is a graduate of University of Texas.

**Dixon H. Cain,** for a number of years connected with Union Producing Co. as district petroleum engineer in the Houston district, has joined Fifteen Oil Co., Houston, as vice president in charge of drilling and production operations. Cain is a graduate of University of Texas, and in 1941 joined Union's production-engineering department at Shreveport.

**Frederick H. Meeder** has been elected president of Richfield Oil Corp. of New York, succeeding **Marc F. Braeckel,** who has resigned as president of that firm to become vice president in charge of the eastern division of marketing for Sinclair Refining Co. **H. G. Meyers** and **R. F. Glock** were elected vice presidents of Richfield of New York. Meeder has served as vice president since 1948, and Meyers moved up from assistant to the president, a post he has held since 1948. Glock has served since that time as general sales manager.

# DEATHS

**Raymond A. Lawson,** 56, Tulsa, retired employe of Gulf Oil Corp., died June 25.

**Joe D. Hughes,** 75, former operator of an oil-field trucking firm which was sold to Brown & Root, Inc., 10 years ago, died in Houston June 23.

**Erwin S. Barrow, Sr.,** Anahuac, Tex., died June 20. He retired in 1948 after 30 years' service with Humble Oil & Refining Co.

**Henry Craig,** 54, North Texas independent geologist, died in Olney, Tex., June 27.

**Rufus Gordon Clay,** 52, oil-well drilling contractor, Fort Worth, died June 27. He was a partner in Clay & Gackle Contracting Co.

**Benjamin Churchill Armstrong,** 64, Kyle, Tex., early-day developer of a number of Texas oil fields, died June 24 at Temple, Tex.

**John M. Loffland,** 73, veteran drilling contractor, died June 26 in Fort Worth. He was associated with his brother, R. S. Loffland, Tulsa, in Loffland Brothers Drilling Co. The firm was sold in 1946.

**Donald Arthur Bering,** 45, automotive superintendent for Shell Oil Co., died in New York City June 26.

**John W. Shields,** 64, Tulsa, purchasing agent for Pure Oil Co., died June 27.

**James R. Gaddy,** 59, gager for Sinclair Pipeline Co., Jacksboro, Tex., died June 26.

**George E. Casey,** 71, veteran pipe liner, died in Gallup, N. M., recently. He was associated with Prairie Pipe Line Co. for 18 years, then joined Republic Pipe Line Co. and Duval Pipe Line Co. in Corpus Christi as superintendent. He was with Stone & Webster Engineering Corp. at time of death.

**Charles Adams,** 54, Fort Worth, manager of Barney Holland Oil Co., died June 28.

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*Klinger Non-Frosting Reflex Level Gage Type K Combined, Size IX/IX/IX for Hydraulic Pressures up to 1,200 p.s.i : 84.5 kg/cm² (84 36 atmospheres)*

The Klinger K Type medium-high pressure Non-Frosting Liquid Level Gages, are especially constructed so as to allow a clear reading, free from rime, to be obtained at temperatures below freezing point.

They are supplied in, unilaterally combined lengths
16.1/16 – 70.1/4 long
or in, single unit form for staggered disposition mounting
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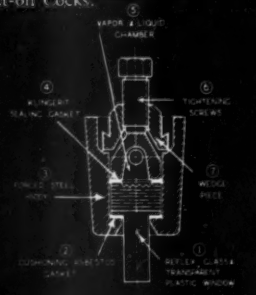
Fitted with or without Klinger rapid service "Sleeve-Packed" shut-off Cocks.

*The reflex glass with the attached transparent plastic window (1) and the cushioning asbestos gasket (2) rest in the rigid box shaped, forged steel body (3). Behind the reflex glass is the "Klingerit" sealing gasket (4), the vapor and liquid chamber (5) being compressed against both, by the centrally disposed tightening screws (6) located in the wedge piece (7).*

*The even pressure exerted on each side of the glass and the sealing gasket minimizes the risk of breakage and corrosion.*



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*Left: Launching aluminum pipe line. Note concrete river weights and temporary pontoons. Right: View on barge at center of line. Flange joint has just been made up and river weight attached. Line is about to be cast off. Coated section of line in foreground, uncoated section in background.*

## Here are the details of the preliminary research and the actual laying of the first experimental

# Aluminum Marine Pipe Line

**by Edward T. Wanderer**

IN the search for a pipe that will resist corrosion in sea water without a protective coating, an experimental aluminum line has been laid in the Gulf of Mexico.

This experimental line is part of the offshore pipe-line system which supplies gas to the Aluminum Co. of America's Point Comfort reduction plant near Port Lavaca, Tex. *(The Oil and Gas Journal, November 4, 1948.)* The over-all system consists of approximately 9 miles of 4 in. and 6 in. pipe for gathering lines, and approximately 14 miles of 8 in. pipe for the main line. The experimental aluminum section consists of 3,500 ft. of gathering line while the remainder of the system is of conventional steel pipe.

All of the gathering lines and about 12½ miles of the main line are under water averaging 14 ft. in depth. The line is operated by Lavaca Pipe Line Co., a subsidiary of Alcoa. The installation of the aluminum line was a joint project of Lavaca Pipe Line Co. and Alcoa's Development Division.

Corrosion of marine pipe lines in the bay areas of Louisiana and Texas is a real problem to pipe-line operators. Regardless of the care exercised in coating and laying steel pipe, there is always some uncertainty about the effectiveness of the protection. There is further question about how long the coating will protect steel pipe against the corrosive action of sea water.

Coatings are often damaged by fishermen's nets, boat anchors, and debris in the water. There have also been cases of marine organisms finding their way through the protective coating. Eventually, the organism grows and cracks the coating, allowing corrosion to start. Even cathodic protection of marine pipe lines may not be practical if damage to protective coatings is great enough.

The experimental line consists of 3,500 ft. of 4 in., Schedule 40, 63S-T6 aluminum pipe. It extends from one of the wells (Well 2, State Tract 95, Matagorda Bay, Calhoun County, Port Lavaca, Tex.) to the header platform which is also in the bay.

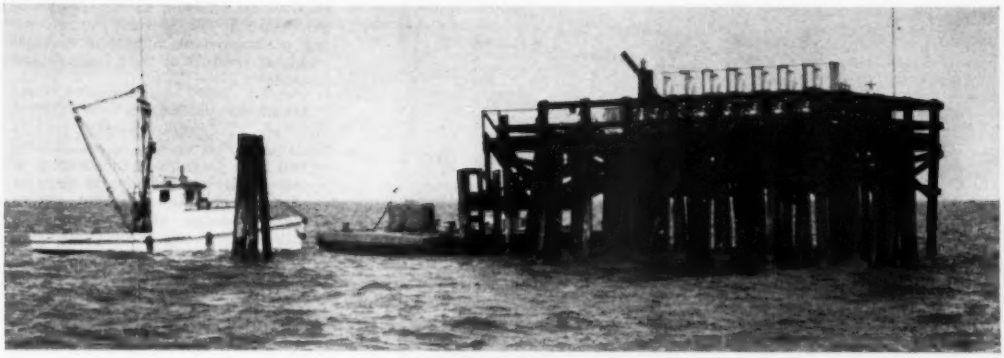
### Previous Marine Service

In deciding to install this aluminum line, Alcoa relied on many years of tests and experience with aluminum alloys in marine service. The hulls of a number of boats, sloops, and yachts had been constructed of aluminum alloys and had performed satisfactorily. Of particular interest was the "Alumette," a center-hull section of a high-speed patrol boat, which was built in scaled-down dimensions and exposed in the James River Estuary of the Chesapeake in January, 1936. Although most of the hull below the water line was painted, a small area was left uncoated so that the effect of sea water on the bare metal could be observed. When last inspected, after 13 years' exposure, this area was still in good condition.

Another interesting application is the experimental use of aluminum to protect wooden pilings in Pensacola Harbor, Florida, from attack by


**THE AUTHOR**

**Edward T. Wanderer is head of the pipe and pressure-vessel section of Aluminum Co. of America's Development Division in New Kensington, Pa. Wanderer received his degree in mechanical engineering from University of Illinois in 1940 and joined Alcoa in the same year. In 1941 he was assigned to Alcoa's New Kensington Tube Division, where he later became assistant superintendent. He assumed his present position in 1948.**



*Gas control and metering platform in Matagorda Bay.*

**TABLE 1—NOMINAL COMPOSITION OF ALUMINUM ALLOYS**

| Alloy— | Per Cent of Alloying Elements—aluminum and normal impurities constitute remainder | | | |
|---|---|---|---|---|
| | Cooper | Silicon | Magnesium | Chromium |
| 61S | 0.25 | 0.6 | 1.0 | 0.25 |
| 63S Wrought | .... | 0.4 | 0.7 | .... |
| 35[e] Cast | .... | 7.0 | 0.3 | .... |

**TABLE 2—TYPICAL PROPERTIES OF ALUMINUM ALLOYS**

| Alloy— | 61S-T6 | 63S-T6 | 35[e]-T6 |
|---|---|---|---|
| Weight per cubic inch, pounds | .098 | .098 | .095 |
| Tensile strength, psi. | 45,000 | 35,000 | 33,000 |
| Tensile yield strength (0.2 per cent set), psi. | 40,000 | 31,000 | 24,000 |
| Elongation in 2 in. (½-in. dia. spec.) | 17 | 12 | 4 |
| Modulus of elasticity, psi. | 10,000,000 | 10,000,000 | 10,000,000 |
| Coefficient of expansion per 1° F. | 0.000013 | 0.000013 | 0.000012 |

marine organisms. These aluminum casings were made from 0.064-in. thick sheet of alloys 3S and 52S. Installed in 1940, they are still in excellent condition.

Thousands of samples have been placed in a variety of marine exposures, and the results have provided an important guide to the use of aluminum alloys under these conditions. Composition, on a nominal basis, of various aluminum alloys is given in Table 1.

### Crude Oil Pipe Lines

The 6½ miles of aluminum pipe which had been installed previously for handling crude oil provided excellent background for the gas line. These 4-in. and 6-in. lines of alloy 63S-T6 were laid in Louisiana and Arkansas. *(The Oil and Gas Journal, September 23, 1948.)* Hydrostatically tested at 1,000 psi., not a single weld required repairing. Construction techniques for aluminum pipe lines were thoroughly worked out during these installations.

It was estimated that an uncoated aluminum pipe line buried under average conditions would cost up to 30 per cent more than a comparable coated steel line. The crude-oil line experience showed that this is conservative and the difference is much less in areas where heavy equipment cannot be used, as in marshy country. Since pipe cost is a smaller part of total offshore-construction cost, it was expected that this difference would also be reduced for underwater lines.

The steel lines of the Alcoa installation were all protected by magnesium galvanic anodes, and this further reduced the cost differential between the aluminum and steel lines. All these factors seemed to justify the experience to be gained by the installation of an experimental aluminum line.

### Specifications

The properties of some of the aluminum alloys used in the line are shown in Table 2. The -T6 temper of the 63S pipe is fully heat treated, but the heat of welding partially removes the effect of heat treatment, thereby reducing the bursting pressure below that of unwelded pipe. The bursting pressure of 4-in. welded pipe joints in 63S-T6 is still about 2,500 psi., however, so that an adequate safety factor exists for handling gas at 500 to 600 psi.

The pipe was supplied in 40-ft. lengths with 37½° beveled ends and a 1/32-in. to $\frac{1}{16}$-in. flat at the inside surface. Dimensional tolerances were the same as for steel pipe. A 40-ft. length of the pipe weighs about 150 lb., or about 3.75 lb. per foot.

Forged, raised-face, 600-lb. welding-neck flanges of aluminum alloys 53S-T6 and 61S-T6 were used. Studs, nuts, and washers of Alumilite-finished alloy 24S-T4 were used for aluminum-to-aluminum flanged joints. Galvanized-steel bolting with insulating sleeves, washers, and gaskets were used for aluminum-to-steel flanged joints. A 6-in., 1,000 psi., aluminum swivel joint of alloy 35[e]-T6 was installed at each end of the aluminum line to permit relative motion

*(Continued on page 76)*

*Overhead inert gas metal arc welding of aluminum pipe.*

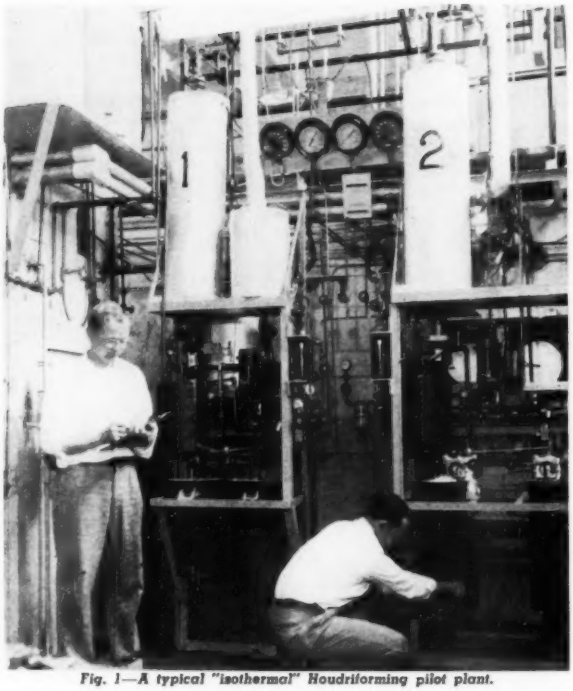



*Fig. 1—A typical "isothermal" Houdriforming pilot plant.*

# HOUDRIFORMING—

## A Continuous Process for Reforming Petroleum Naphthas

**by C. G. Kirkbride***

THE selective transformation of the constituents of naphthas without cracking has been the object of reforming for many years. Thermal reforming,[1] hydroforming,[2] and catalytic reforming processes employing platinum catalysts[3] have shown the trend for more specific reactions. In the experimental work to be presented, the effect of changing catalyst properties will be discussed.

Houdriforming is capable of the production of maximum yields of benzene, toluene, and xylene from specific fractions of a crude. The production of high yields of high-octane gasolines from straightrun naphthas is also made possible by Houdriforming. The isomerization function of the catalyst in addition to the dehydrogenation function permits the reforming of low-octane naphthas to high yields of product of very high octane number.

**Aromatics production.**—A typical "isothermal" Houdriforming pilot plant is shown in Fig. 1, and a simplified flow diagram of the process in Fig. 2. In life tests (30 to 50 days of continuous operation without regeneration or loss of catalyst activity) in multibed adiabatic units, different charge stocks were processed at widely varying conditions over the same catalyst. A charge stock comprising a 150°-220° F. cut of an East Texas-type naphtha was used as a base stock and was run periodically at fixed conditions to check the catalyst activity. The properties and composi-

**TABLE 1—INSPECTION OF BASE STOCK FOR AROMATIC PRODUCTION**

| | |
|---|---|
| Boiling Range,* °F. | 150-220 |
| Gravity, °A.P.I. | 60.2 |
| Distillation, A.S.T.M.: | |
| I.b.p., °F. | 162 |
| 10 per cent | 180 |
| 30 per cent | 186 |
| 50 per cent | 190 |
| 70 per cent | 196 |
| 90 per cent | 204 |
| Dry point | 215 |
| Composition: | |
| Benzene | 1.8 |
| Toluene | 4.2 |
| Methyl cyclopentane | 5.1 |
| Cyclohexane | 14.3 |
| Dimethyl cyclopentanes | 9.2 |
| Methyl cyclohexane | 22.7 |
| Paraffins | 42.7 |

*Temperatures are the cut points during preparation of this stock using a 20-plate distillation column.

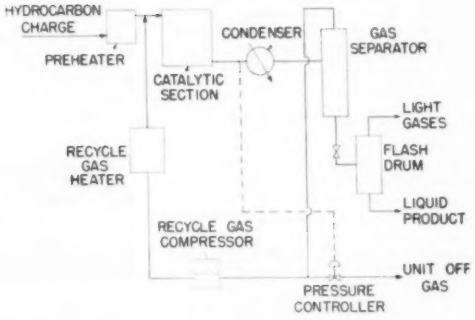



*Fig. 2—Flow scheme of Houdriforming process.*

*Vice president research and development, Houdry Process Corp. Paper presented before joint meeting A.I.Ch.E.-A.C.S. at Tulsa, 1951.

**Houdriforming is a catalytic process for reforming petroleum naphthas to aromatic concentrates and high-octane gasoline. Dual-function catalysts have been developed for this process. These catalysts are very selective for (1) the dehydrogenation of $C_6$ ring naphthenes, (2) the dehydro-isomerization of alkyl cyclopentanes, and (3) the isomerization of normal and slightly branched paraffins into highly branched paraffins. Essentially no hydrocracking occurs and, therefore, substantially pure hydrogen (97+ per cent) is produced. The catalysts are not affected by sulfur compounds including thiophene. The process is nonregenerative, although for flexibility of operation and for protection in case of error in operation the catalyst can be regenerated in place. The process is in an advanced state of pilot plant development. Detailed process design and mechanical engineering for commercial scale operation are under way.**

TABLE 2—HOUDRIFORMING OPERATIONS PROCESSING A 150°-220° F. EAST TEXAS-TYPE NAPHTHA FOR BENZENE AND TOLUENE PRODUCTION

| | Order of increasing severity | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| Liquid product $C_5$-free, volume per cent of charge | 93.2 | 92.2 | 91.5 |
| Aromatics in liquid product, volume per cent | 38 | 45 | 48 |
| Conversion of naphthenes to aromatics, per cent | 70 | 84 | 90 |
| Unit off gas produced, standard cubic feet per barrel | 1,160 | 1,310 | 1,360 |
| Hydrogen content of off gas, volume per cent | 98.5 | 98 | 97.5 |

tion of this stock are presented in Table 1.

The availability of naphthenes in this charge stock would allow a stoichiometric yield of 48.4 volume per cent aromatics based on the charge; this includes the aromatics originally present in the charge. Stoichiometric conversion of the naphthenes, as will be evident later, is not directly attainable because of thermodynamic equilibrium considerations.

**Catalyst selectivity.**—The yields of aromatics produced from this charge stock are summarized in Table 2. The yield of aromatics increases to very high levels as the severity of operating conditions is increased. A significant fact is that the hydrogen recycle gas and off gas from the unit consists of 97.5-98.5 volume per cent hydrogen at all conditions. In this operation gas separation was effected in a simple pressure separator at atmospheric temperature. The yield of hydrogen is better than 90 per cent of theoretical based on conversion of naphthenes to aromatics. These facts indicate that the catalyst is very selective and promotes very little hydrocracking at the operating conditions employed.

The base charge stock described previously was processed at a fixed set of conditions. Check runs were made with this stock at the same conditions after 18, 24, and 35 days of continuous operation. No change in the activity of the catalyst could be detected at any of these check intervals. For the investigation of process variables, a multibed adiabatic unit has been used.

**Temperature pattern.**—The same unit has been used to obtain engineering design data. Typical of the type of information obtained is the temperature pattern for the first reactor shown in Fig. 3. Similar patterns prevail in succeeding reactors. However, the temperature drop decreases for each succeeding reactor as will be seen later. The number of reactors put in series is dependent on the particular stock to be processed and the type of operation to be carried out.

Other stocks investigated have included $C_6$ fractions containing up to 57 per cent methyl cyclopentane. In addition to quantitative dehydrogenation of cyclohexane present, major proportions of the methyl cyclopentane have been converted to benzene, depending on severity of operations and nature of feed.

**Theoretical.**—Thermodynamic considerations are significant in aromatics production because they limit the products which can be attained under the various operating conditions.

Consider the two reactions involved in benzene formation:

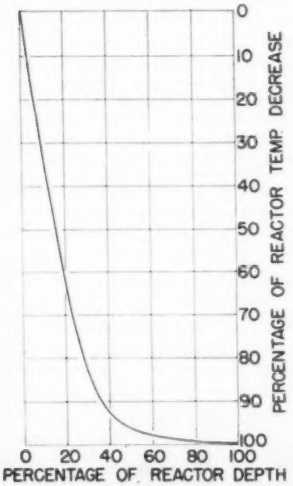



*Fig. 3—Temperature pattern in Houdriforming reactor.*

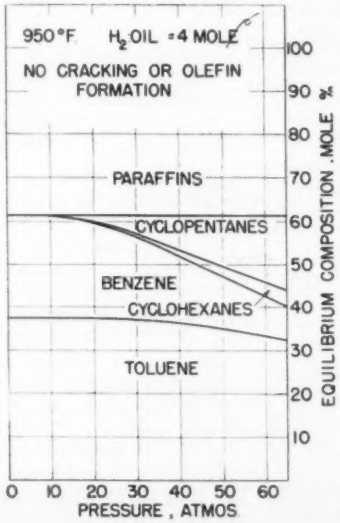



*Fig. 4—Equilibrium conditions for an "East Texas-type" naphtha.*

$C_6H_{12}$ (cyclohexane) $\rightleftarrows C_6H_6 + 3H_2$;

$$Kp^{(1)} = \frac{(pH_2)^3\,(p\,C_6H_6)}{(p\,C_6H_{12})} = 10^6 \text{ at } 950^\circ \text{ F.} \qquad (1)$$

$C_6H_{12}$ (cyclohexane) $\rightleftarrows C_6H_{12}$ (methyl cyclopentane);

$$Kp^{(2)} = \frac{P\,(\text{methyl cyclopentane})}{P\,(\text{cyclohexane})} = 12 \text{ at } 950^\circ \text{ F.} \qquad (2)$$

The pressure of hydrogen obviously has a very powerful influence on the $C_6H_6$ to $C_6H_{12}$ mol ratio in the product and indeed, in the pressure range studied, is the limiting factor for benzene production at a given temperature. It is evident from Fig. 4 that at pressures above 300 psi. the equilibrium amount of benzene falls off rapidly, while the amounts of cyclohexane and cyclopentanes concommitantly increase. On the other hand, the equilibrium toluene concentration remains high to a much higher pressure than for benzene. Fig. 4 is based on thermodynamic data from A.P.I. Project 44[4] and represents the equilibrium condition for an East Texas-type naphtha at a $H_2$/oil mol ratio of 4 at 950° F., olefin formation not being permitted. Under the present circumstances, pressures may be substituted for fugacities satisfactorily.

Temperature affects the several equilibria to a critical degree. This is shown in Fig. 5 in which is presented (for a $H_2$/hydrocarbon mol ratio of 5 and a total pressure of 300 psi.) the relative amounts of benzene-cyclohexane and benzene-cyclohexane-methyl cyclopentane. It is evident that isomerization to form methyl cyclopentane offers an important reaction from the standpoint of benzene yield.

Of course, it should be realized that if a stock to be processed contains a large percentage of cyclohexane, it would be better to employ a catalyst not having isomerization activity. However, most commercial light naphthas contain relatively important quantities of methyl cyclopentane; hence, it is necessary to employ a catalyst possessing dehydroisomerization activity.

**Adiabatic operation.**—The maximum yields obtainable in adiabatic operation can be calculated on the basis of thermodynamic equilibrium, the heat of reaction, and the heat capacity of the reaction constituents. Dehydrogenation of naphthenes is highly endothermic and this heat is supplied by the sensible heat of the reaction constituents. A temperature-conversion line can be calculated, starting at reactor inlet conditions of temperature and composition. When plotted on the same figure as the equilibrium composition, this line will intersect the equilibrium line at a

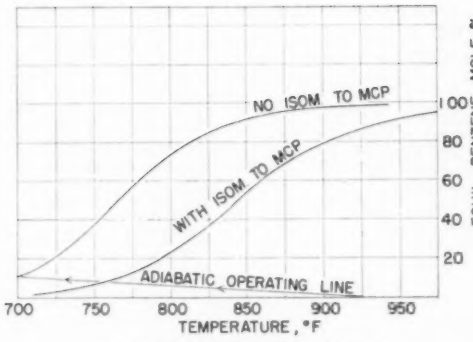



*Fig. 5—Dehydrogenation of cyclohexane.*

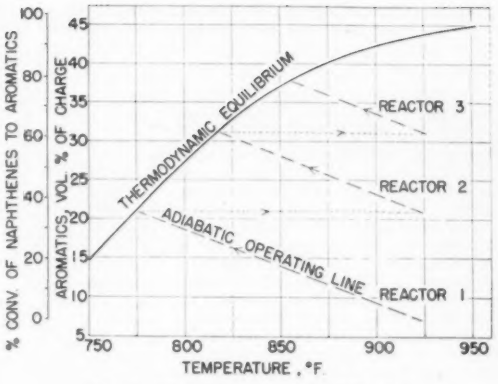



*Fig. 6—Adiabatic operation, Houdriforming.*

point which then represents the maximum amount of aromatics obtainable in a single adiabatic reactor. This is shown in Fig. 5 for cyclohexane dehydrogenation with a reactor inlet temperature of 925° F.

In actual operation, dehydrogenation and isomerization reactions of all the naphthenes to respective aromatics must be considered. Heat carried by paraffins is substantial. The adiabatic operating lines and thermodynamic equilibrium for the stock, specifications of which are given in Table 1, are shown in Fig. 6. The effect of reactor inlet temperature and number of reactors is clearly illustrated. It was found experimentally that individual reactor operation of Houdriforming followed closely the theoretical adiabatic operating lines.

Ordinarily the process is nonregenerative for the production of aromatics from a single wide-cut charge stock. However, for most severe conditions on unusually wide boiling-range charge, a catalyst deposit may accumulate slowly and the ability of the catalyst to be regenerated provides maximum flexibility. Thus a nonblocked-out operation can be employed for the simultaneous production of benzene, toluene, and xylenes.

### Gasoline Production

Upgrading of motor gasoline by Houdriforming is accomplished by five reactions: (1) conversion of six-membered ring naphthenes to aromatics, (2) dehydroisomerization of alkyl cyclopentanes to aromatics, (3) isomerization of straight chain or slightly branched paraffins to highly branched paraffins, (4) dehydrocyclization of paraffin to aromatics, and (5) desulfurization of naphtha which improves the lead response. The isomerization function of the catalyst for converting low octane paraffins to high octane branched chain paraffins is of great importance in attaining the high yield of high octane reformate.

Conversion of naphthenes to aromatics improves the octane rating only in the case of higher boiling naphthenes. Thus, the conversion of methyl cyclopentane and cyclohexane (F-1 blending value 107 and 110, respectively) to benzene (F-1 blending value 99) actually involves a loss of blending octane number, while the conversion of dimethyl cyclohexane to xylene increases the blending octane number from 68 to 145. In employing Houdriforming for motor gasoline production it is, therefore, desirable to use only feed stocks which have been fractionated to include the maximum amount of naphthenes in a boiling range in which octane improvements can be obtained.

**Results with catalysts.**—In Fig. 7 are shown octane-yield relationships for an East Texas-type naphtha after

**TABLE 3—INSPECTION OF CHARGE STOCK FOR GASOLINE PRODUCTION**
**(East Texas-Type Naphtha)**

| | |
|---|---|
| Boiling range, °F. | 188-368 |
| Gravity, °A.P.I. | 55.3 |
| Distillation, A.S.T.M.: | |
| I.b.p., °F. | 188 |
| 10 per cent | 215 |
| 30 per cent | 232 |
| 50 per cent | 252 |
| 70 per cent | 280 |
| 90 per cent | 317 |
| Dry point | 349 |
| Sulfur, per cent | 0.006 |
| Composition: | |
| Paraffins, volume per cent | 44 |
| Olefins, volume per cent | 0 |
| Naphthenes, volume per cent | 42 |
| Aromatics, volume per cent | 14 |
| Octane number: | |
| F-1 clear | 51.2 |
| F-1 +3 cc. TEL | 76.6 |

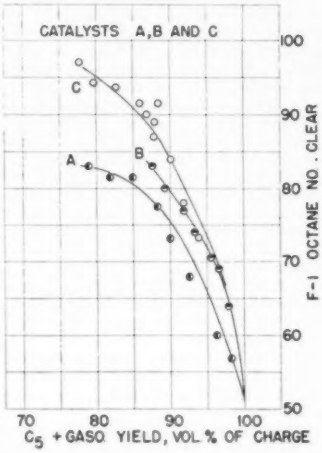



*Fig. 7—Houdriforming 180°-370° F. "East Texas-type" naphtha.*

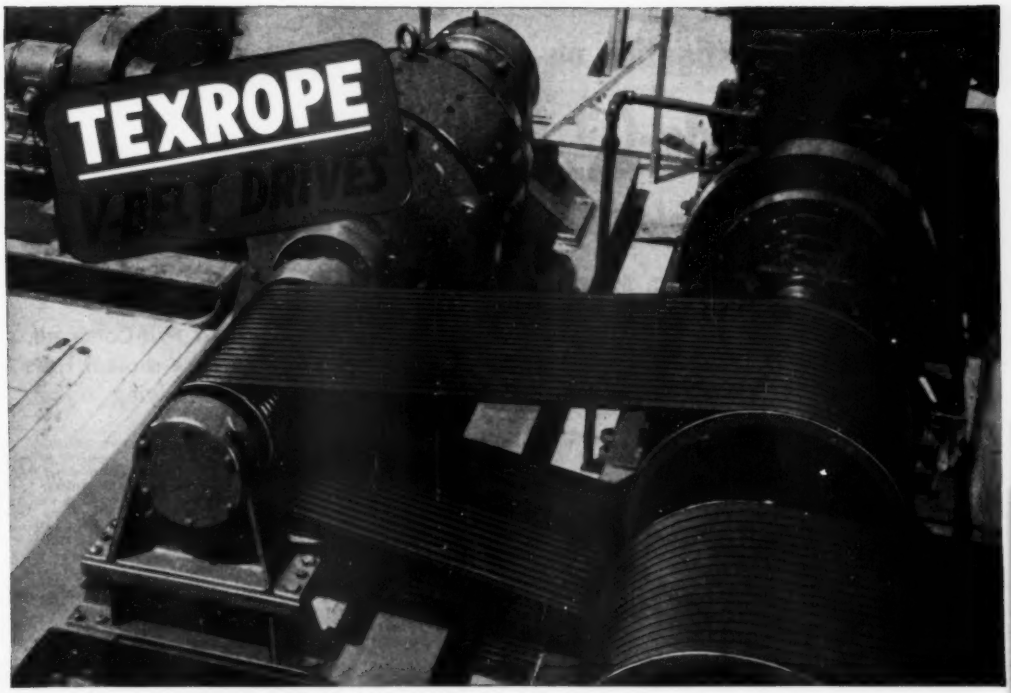
Houdriforming under different operating conditions with different catalysts. The specifications of this naphtha are given in Table 3. Curve A, Fig. 7, represents results obtained with a commercial molybdena-alumina hydroforming catalyst and shows how hydrocracking lowers yield without corresponding octane gain. Also a type of hydrocracking occurs

*(Continued on page 79)*

**TABLE 4—HOUDRIFORMING OF EAST TEXAS-TYPE NAPHTHA**
(188°-368° F., F-1 Clear 51.2, F-1 +3 cc. TEL 76.6)

| | Condition | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| Yield: | | | |
| $C_5$+, volume per cent of feed | 77.7 | 88.5 | 96.0 |
| Weight per cent of feed | 82.8 | 92.7 | 98.0 |
| $C_4$, volume per cent of feed | 17.2 | 6.1 | 1.2 |
| F-1 clear, 3-lb. R.v.p. gasoline | 97.3 | 91 | 71 |
| F-1 +3 cc. TEL, 3-lb. R.v.p. gasoline | Isooctane +0.3 cc. TEL | 98 | 87 |
| 10-lb. R.v.p. gasoline calc., volume per cent | *86 | †98 | ‡106 |
| F-1 clear, calc. | 90 | 92.5 | 75 |
| F-1 +3 cc. TEL calc. | >100 | 99 | 89.5 |

*Excess butane over 10-lb. R.v.p. gasoline is 8.9 volume per cent. †Outside butane required for 10-lb. R.v.p. gasoline is 3.4 per cent. ‡Outside butane required for 10-lb. R.v.p. gasoline is 8.8 per cent.

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# Laboratory Investigation on

# Testing Crude-Oil Emulsions

## *for selection of an adequate demulsifying agent*

**by C. M. Davis* and R. G. Crippen†**

**In this investigation a Gulf Coast, a Mid-Continent, and a heavy California-type crude were chosen. Tests demonstrated the utility of a demulsifying agent.**

SERVICE companies have suggested use of a 2 per cent solution of treating agent as a concentration standard in conducting comparative tests for a possible correlation between the laboratory and field emulsion problems. It is rather common for minimum treating ratio agent to crude to be 1 to 50,000 and a very seldom required maximum ratio of 1 to 2,500. It was found that 6 oz. molded cap graduated prescription bottles are good containers for conducting demulsifying tests. The interfacial area which was afforded proved to be satisfactory. Kahn serological pipettes of 0.1 to 0.2-ml. capacity were employed for introducing the treating agent.

### Procedure

One hundred cubic centimeters of emulsion is put into a 6 oz. bottle with 0.3 cc. of prediluted demulsifying material by means of the Kahn serological pipettes. The bottle is shaken vigorously 200 times and changes in color are observed. The cap of the bottle is left partly unscrewed to permit escape of gas and the mixture is kept in a water bath which is maintained at 115° F. The sample is observed at 5, 15, 30, and 60-minute intervals to note appearance of the emulsion.

Particular reference is made at the end of 5 minutes to evaluate the amount of the interface and the clearness of the oil. The adequate chemical at this time will produce clear oil with relatively large water drops, a small amount of loose interface, and clear water. An undesirable chemical for the emulsion under consideration leaves a hazy oil layer with very small water droplets and considerable interface remains.

A very poor agent causes only slight darkening of the oil layer and little if any water is produced. Comparison of the amount of the water which has settled out in 1 hour is made with that amount after 24 hours. After the 24-hour observation, the sample is shaken vigorously 200 times and the quantity of water which has settled out in an hour is noted.

Employing a graduated pipette 7.5 ml. of dehydrated oil is transferred to a centrifuge tube containing 7.5 ml. of diluent such as xylene. The tube is then filled to 50 per cent mark with xylene. Dehydrated oil is then poured into the tube up to the 100 per cent mark and contents shaken a few times. The tubes are centrifuged for a few seconds at 1,000 r.p.m. and the b.s. and w. are noted. Then the tubes are centrifuged again at 1,500 r.p.m. until readings remain constant. The 1,000 r.p.m. run is to determine the "loose" basic sediment.

Where a tentative favorable demulsifying agent has been selected as a result of the centrifuging test, the sample containing it is reshaken vigorously 100 times and the oil and water should not reemulsify, and separation should occur in only a few minutes. Reemulsification is to be avoided for practical consideration because of the usual constant flow of oil in production.

Upon selection of a demulsifying agent for a particular application an overtreating test is run employing about 10 times the amount required to resolve the oil. A suitable chemical will resolve the emulsion at this concentration although it might be more sluggish in so doing. An unsatisfactory material will cause the water to form a heavy sludgy material. In practice, wells flow intermittently many times and overtreatment is encountered occasionaly as a result of the constant injection rate of the treating agent.

It is often desirable to repeat the tests at a temperature of 180° to 200° F.

### Discussion of Experimental Results

Three representative samples of crude-oil emulsion were chosen for this investigation. These were a Gulf Coast, a Mid-Continent, and a heavy California-type crude oil.

Initial color changes gave an indication of the speed of the demulsifying agent and the effectiveness of its action.

Eight types of agents of one of the manufacturers were employed and the one designated as code number "A" showed 20 per cent clear water within 5 minutes as well as a pronounced change in color. At the end of an hour the percentage (25) of clear water was the same as at the end of 24 hours. It is considered that code number "A" was the correct formula for the Gulf Coast crude.

Five kinds of agents of another manufacturer were used on the same crude. It is interesting to note here that code number "B" indicated 20 per cent water after 5 minutes contact, while code number "C" showed none. After 60 minutes code number "B" showed 24 per cent water and "C" indicated a pronounced color change. However, at the end of 24 hours B and C showed 24 per cent and 26 per cent water respectively.

On the Mid-Continent crude "C" had no resolving power after 5 minutes but in an hour 2 per cent water had separated. After 24 hours, the sample had completely resolved giving 3 per cent water. Ten types of samples of the other manufacturer were tried on the Mid-Continent crude and "D" indicated 3 per cent water after 5 minutes. A grind-out sample of "C" and "D" indicated 0.1 per cent b.s. and 0.1 per cent water still remaining in the crude. It is concluded both demulsifiers have equal resolving power for this crude. However, from the point of view of time, "D" is to be preferred.

On the California crude emulsion, demulsifier "B" proved to be rather effective. After 1 hour it indicated 5 per cent clear water and this observation remained constant for the 24-hour period. A grind-out sample on "B" treated crude gave 0.5 per cent b.s. and 0.8 per cent water.

Conversion charts and graphs are available for translating the laboratory results to field units (cubic centimeters to quarts). These charts also provide a convenient means for determining barrels of recoverable oil per quart of demulsifier.

### Approximate Cost of Field Facilities

For treating Mid-Continent crude a representative setup includes a 750-bbl. gun-barrel tank with a capacity of 40 to 80 bbl. per hour, heating boiler, centrifugal circulation pump (capacity 80 bbl. against 40-ft. head), connections and fittings, gas regulator, and thermostat. Along with labor and trucking the installation costs about $3,500. It is estimated the average cost of treatment of emulsified petroleum is about $0.035 per barrel.

A rather recent development in treating oil is the use of "flow treaters" through which the emulsified oil passes. Constant heat is maintained by gas-fired burners installed within the shell of the treater. Thermostatic control is employed. Pilot-operated diaphragm valves and fluid-level control valves are used to insure smooth control of the discharge of water, oil, and gas from the flow treater.

### Conclusions

The utility of a demulsifying agent has been manifested by the series of experiments which are reported here. Response of the emulsion to surface-active chemicals is quite sensitive and precise duplication of results is not always possible. For example, identical experiments on the Gulf Coast and Mid-Continent crudes made within 6 weeks of each other did not exactly compare.

Centrifuge tests are required even on the brightest appearing treated oil for it may contain certain amounts of b.s. and w. The initial color change does give a definite indication of the effectiveness of the demulsifier. However, it has been noted that a slower-acting chemical may become the better treating agent if sufficient time is allowed.

*Associate professor of petroleum and natural-gas engineering Pennsylvania State College. †The Texas Co.

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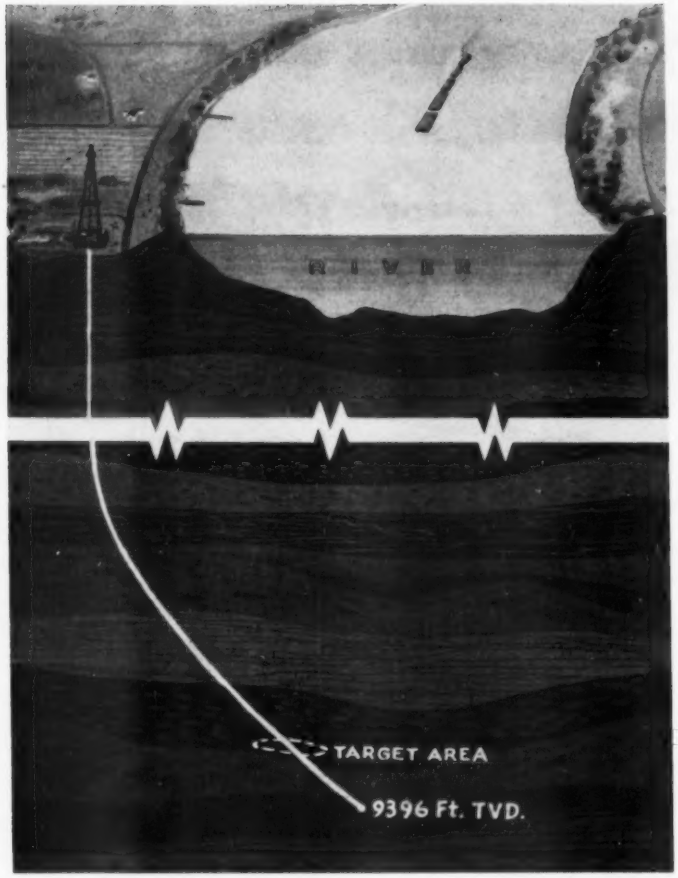



*This diagram illustrates a directional-drilling operation carried out by Humble Oil & Refining Co. After the drill bit reached a depth of 3,000 ft., it was deflected out under the Mississippi River to a total vertical depth of 9,396 ft.*

# Tough Drilling

**by Leigh S. McCaslin, Jr.**
Gulf Coast District Editor

## Getting to site of location, preparing for drilling are major problems facing the Gulf Coast oil operator

GULF COAST operators are faced with some of the most difficult drilling problems of any area in the world. This can be strikingly shown by describing a few of the drilling operations of the past year. These problems are not concerned with making hole, necessarily, although lost circulation is a major problem.

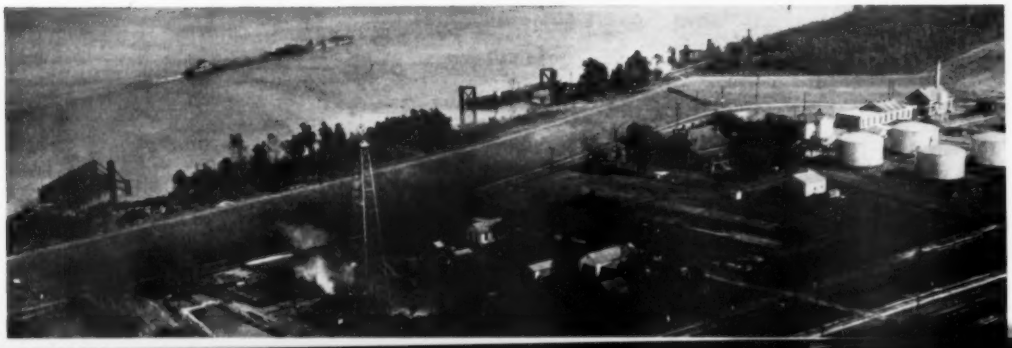
The more dramatic problems are concerned with getting into a drilling location or preparing the actual drilling site. These difficulties are brought about primarily by the nature of the terrain. The many swamps, marshes, bays, lakes, rivers, and bayous of the Gulf Coast are primarily responsible for the difficult drilling. In addition, the exploitation of the reservoirs under the Gulf of Mexico has created a new set of problems due to the hazards of operating in unprotected Gulf waters.

### Pontoon Ferry

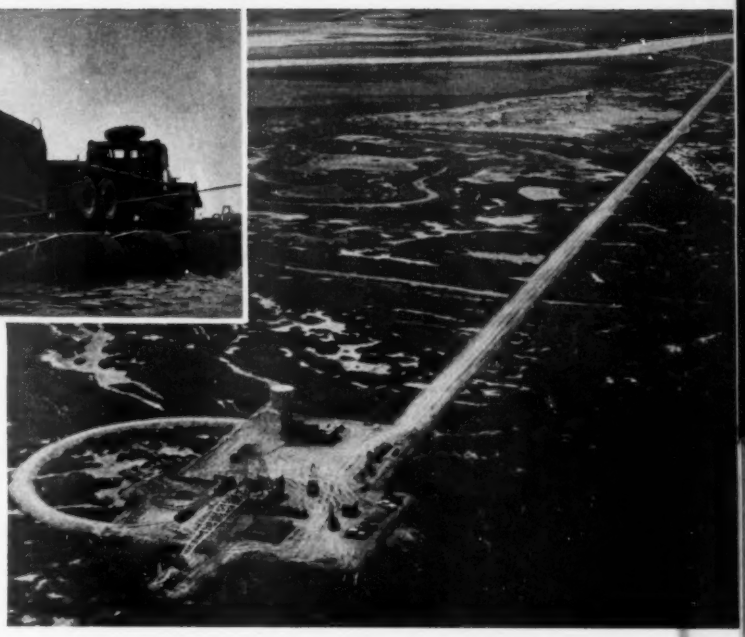
Humble Oil & Refining Co. engineers utilized a pontoon ferry to solve their problems at a marshy location in the Nueces River estuary about 12 miles northwest of Corpus Christi.

**The problem.**—This involves rigging up on a wildcat location in lowlands which would hardly support the weight of a man. The job is to be accomplished without building any expensive bridges and without any dock facilities. The task is to be completed prior to a rapidly approaching lease-expiration date.

This was obtained in the form of a small pontoon ferry, like those used by the Armed Services in World War II. It was supplied Humble by Portable Bridge & Equipment Co. Seven pontoons, each 33 ft. long and 8 ft. wide, were joined together to form



*Target for this Humble rig, located about 600 ft. from water's edge of the Mississippi River, is a point approximately below the barge shown in the upper left of this view.*



*Above: Transporting truck and boiler by pontoon ferry. Other heavy loads were moved into Humble's wildcat location in marshy land near Corpus Christi via this method.*

*Right: A newly built road extends from pontoon ferry crossing on the Nueces River across marshy land to Humble's location near Corpus Christi.*

the base. Over these were laid parallel steel tracks to accommodate trucks. The steel tracks have flexible ends which slide upward on contact with timber ramps installed on both banks of the river, making a smooth connection between ferry and land.

Power to propel the ferry was supplied by a 10-hp. motor. To keep the small craft on course against wind, current, or tide, a rope reaches out on each side to pulleys which roll on heavy steel cables swung across the river 10 ft. above water level.

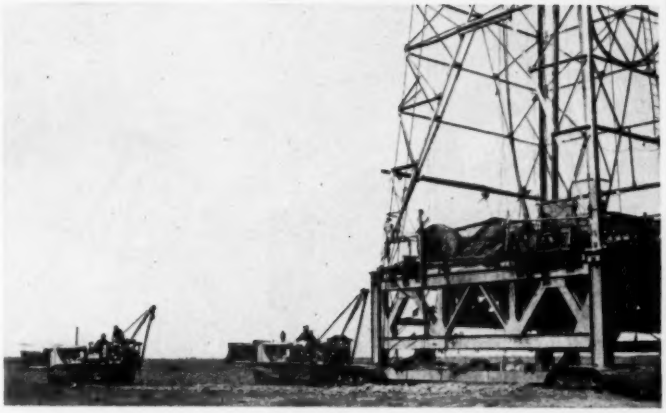
This unusual little vehicle made it possible to carry across the river dump trucks hauling dirt and shell to build more than a mile of road and to raise the level at the drilling site itself up to 5 ft. above the marsh.

In addition the ferry had the big job of carrying the heavy trucks which brought in boilers, draw works, derrick, and other drilling equipment. Taking them one at a time the ferry completed the whole job in 2 days without incident.

### Rig Skidding

Softness of the terrain in the Gulf

*(Continued on page 84)*



*Less than 1 hour was taken up in skidding Shell Oil Co.'s No. 12 rig distance of 6,000 ft. Moving of the 136-ft. structure proved comparatively simple with a team of tractors.*

*The engine platform of Shell's No. 12 rig en route to its new location in Gohlke field.*

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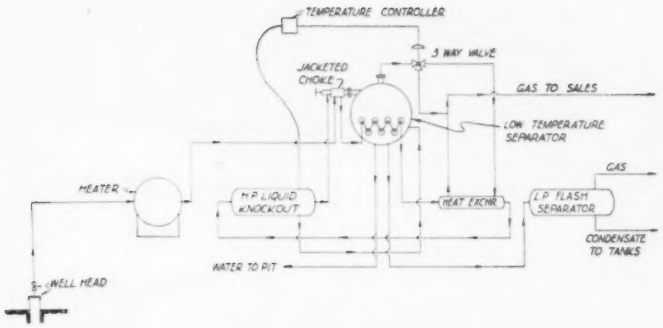


*Fig. 1—Flow scheme of low-temperature condensate-recovery system. (Patented and patents pending.)*

# Low-Temperature Separation

## as applied to gas-condensate production

**by A. W. Francis, Jr.***

**Proper application of separation equipment on high-pressure gas-condensate wells can result in higher hydrocarbon yields, more profit for the operator**

THE advantages of processing natural gas for pipe-line delivery as it leaves the producing wells has been a major contributing factor toward involving gas producers in processing operations which were previously carried out in large processing plants. This factor has been the impetus for the development of such related equipment as packaged gas dehydration and packaged hydrocarbon dew-point depression units.

Low-temperature separation is another of the gas producer's tools which finds application in the high-pressure gas fields usually referred to as "vapor phase" reservoirs. In this process the low temperatures obtainable from the expansion of these high-pressure gas streams is utilized to a profitable advantage. A more efficient recovery of the hydrocarbon condensate and a greater degree of dehydration of the gas as compared to the conventional heater and separator installation are the two major advantages of low-temperature separation.

This process for extracting hydrocarbons from high-pressure gas streams at low temperatures is not new. It was carried out, as early as 1936, when gas markets were very limited, on both plant-size and individual well scales, complete with the formation and subsequent melting of hydrates. Packaged units are now available for this purpose.

*National Tank Co., Tulsa. Presented at A.P.I. Division of Production meeting, Casper, Wyo.

### Description of Process

Low-temperature separation, in its present status of application, is accomplished in a number of different types of units. In order to eliminate confusion and permit going into more detail, the remarks in this paper will be limited to one particular type of unit. It will be easy to understand how modifications and variations from the particular unit under discussion may vary in accordance with the physical properties of the gas-condensate production for which the equipment is to be supplied.

Basically any low-temperature-separation process, which utilizes high well-head flowing pressure to accomplish self-refrigeration, depends upon its success of operation to that of forming hydrocarbon hydrates and then removing those hydrates from the stream and melting them under a hydrocarbon blanket, or using an inhibitor to prevent the formation of hydrates and removing the water mixed with the inhibitor from the hydrocarbon stream. This discussion will be limited to the type unit that permits the formation of hydrocarbon hydrates and the subsequent removal of these hydrates in the form of liquid water. Discussion will also be confined to the type of low-temperature unit illustrated in the schematic flow diagram in Fig. 1.

The gas stream, at well-head pressure, is brought to the unit via a heater or directly without a heater, depending upon the flowing temperature characteristics of the well. The high-pressure stream first enters the jacketed portion of the expansion choke and then is conducted into the heating coil placed in the lower part of the low-temperature separator. This heating coil is submerged in the liquids extracted from the gas-condensate stream. The heat supplied to liquid in this vessel by this gas stream serves two purposes: (1) to melt the hydrates so they can be removed from the vessel as water, and (2) to heat the hydrocarbon condensate so as to effect some stabilization of that liquid before it is discharged to storage tanks.

After the gas leaves the heating coil, it enters the tube side of a shell-and-tube heat exchanger. This heat exchanger, and its attendant control devices, performs an important function in this process, in that they provide the system with a considerable degree of flexibility. The prime function of the heat exchanger and its controller is to control the temperature of the high-pressure gas immediately upstream to the expansion choke. In order fully to utilize this low-temperature-separation process the temperature immediately upstream to the choke should be maintained at a level near the hydrate-formation conditions, yet at the same time the temperature should not be permitted to go so low as to cause hydrate formation prior to its passage into the expansion choke.

After leaving the tube side of the heat exchanger the gas stream, at near full well-head flowing pressure, enters a liquid knockout vessel. The liquid components (hydrocarbon and water) existing at the operating pressure and temperature are removed from the stream in this vessel and discharged into the lower part of the low-temperature separator.

The liquid-free high-pressure gas then enters the expansion portion of the jacketed choke and is expanded into the upper part of low-temperature separator. The temperatures resulting from this expansion may be in region of 0° F., depending of course upon operating conditions. The hydrates formed and the hydrocarbons condensed in this expansion are removed from the gas and deposited in the liquid-storage space of the low-temperature vessel.

The cold gas then leaves the separator and enters a three-way diaphragm-actuated motor valve where flow is split to send only that part of the cold gas stream through the shell side of the exchanger as is demanded by the temperature controller. The gas which bypassed the heat exchanger and the gas which was conducted through the shell side of the heat ex-

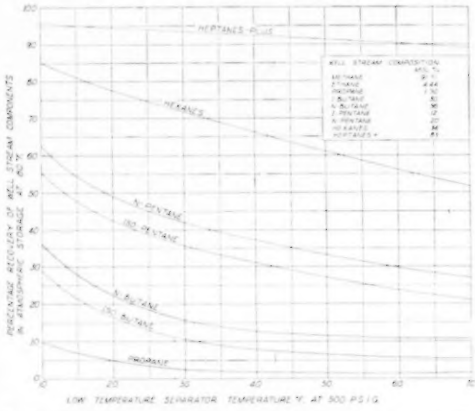


*Fig. 2—Per cent recovery of well-stream hydrocarbon components.*

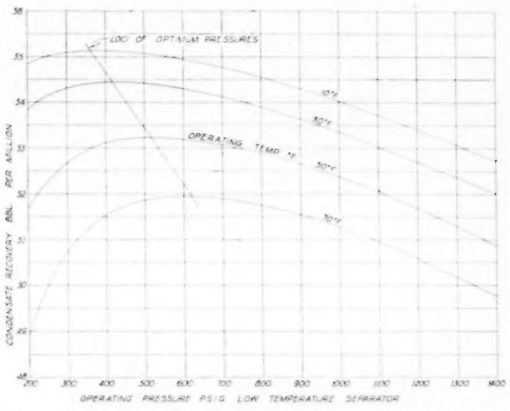
LOCI OF OPTIMUM PRESSURES
OPERATING TEMP °F.
CONDENSATE RECOVERY BBL. PER MILLION
OPERATING PRESSURE P.S.I.G. LOW TEMPERATURE SEPARATOR

*Fig. 3—Condensate recovery as a function of pressure and temperature.*

changer are joined in a common line and delivered to the gas sales outlet.

The water accumulated in the low-temperature separator from the high-pressure fluid knockout plus that obtained from melting the hydrates is discharged from this vessel separately from the hydrocarbon condensate. The condensate is generally staged through at least one intermediate flash before being released to the storage tanks.

### Hydrocarbon Liquid Recovery

Table 1 presents operating data on some units where direct comparisons between conventional and low-temperature operation were possible. The recovery data were taken from a comparison of the pipe-line run tickets and are therefore a very practical indication of the magnitude of hydrocarbon liquid increases.

The 12 units cited are operating on a condensate content of from a low of 14 bbl. per million cubic feet of gas to a high of 223 bbl. per million cubic feet of gas, with well-head flowing pressures varying from 1,800 to 3,210 psi. with gas delivery pressures of from 365 to 950 psi. These data indicate that the gain in stock-tank liquid over conventional operation ranged from a minimum of 4 to a maximum of 15 bbl. per million cubic feet of sales gas. A dollar value, to the producer on this additional revenue, has been placed on this gain. The data in the last column present these values.

Two very natural questions that an observer would ask are: (1) "Since there is a marked increase in the liquid recovery from operating at low temperatures, from what sources does this increased hydrocarbon liquid come, and (2) what are the stability characteristics of the stock-tank liquids recovered from low-temperature-separation operations?"

The additional hydrocarbons recovered from this process are illustrated in Fig. 2 which shows the calculated per cent recovery of each well-stream component at a constant pressure of 500 psi. and a temperature range of 70° to 10° F. The recovery calculations were based on the final flash conditions to storage tanks of 14.7 psia. and a flash temperature of 80° F. With this in view the calculated recoveries are based upon a liquid having stability characteristics equivalent to one having a true vapor pressure of 14.7 psia. at a temperature of 80° F. This means that the recovery calculations for each temperature condition were based on stock-tank liquids of equal stability. On first examination the foregoing statement may provoke concern, particularly in view of the increased recovery of the volatile fractions, butane and propane, at the lower-temperature conditions. However, when one considers the very marked increase of the heavier or lower vapor-pressure components, hexanes and pentanes, one realizes how the recovery of the butane and propane fraction can likewise be increased without affecting the stock-tank liquid stability. The increase in the recovery efficiency of (1) the hexanes from 52 per cent at 70° F. to 85 per cent at 10° F., (2) the normal pentanes from 27 to 62.5 per cent, and (3) the isopentanes from 21 to 55 per cent serves as a good indication of the source of the higher liquid recoveries experienced by operators of low-temperature separation.

As for the second question concerning stability characteristics of the stock-tank liquids, the calculations presented add emphasis to the field observations that the stock-tank liquid compares favorably with that recovered from stage-separation recovery at temperatures above the hydrate-formation conditions. Some rather recent field comparison weathering-loss tests conducted during Jan-

**TABLE 1—DIRECT COMPARISON DATA OF LIQUID HYDROCARBON RECOVERY, CONVENTIONAL VS. LOW TEMPERATURE SEPARATION**

| Unit No. | Location | Operating conditions: Well-head H.-P. separator Press. | Well-head H.-P. separator Temp., °F. | Low-temperature separator Press. | Low-temperature separator Temp., °F. | Condensate recovery with low-temp. separator bbl./M.M.c.f. sales gas | Gain in stock-tank prod. with low-temp. operation bbl./M.M.c.f. of sales gas | Additional revenue per M.M.c.f. of sales gas at $2.65/bbl. |
|---|---|---|---|---|---|---|---|---|
| 1 | Southwest Texas | 1,800 | 75 | 365 | 22 | 24 | 5 | $13.25 |
| 2 | South Louisiana | 2,500 | 84 | 600 | 24 | 20 | 5 | 13.25 |
| 3 | North Louisiana | 2,325 | 90 | 950 | 50 | 124 | 13 | 34.45 |
| 4 | South Louisiana | 2,750 | 86 | 600 | 16 | 48 | 15 | 39.75 |
| 5 | South Louisiana | 2,860 | 90 | 635 | 19 | 53.7 | 8.2 | 21.73 |
| 6 | North Louisiana | 2,670 | 90 | 950 | 50 | 105 | 15 | 39.75 |
| 7 | East Texas | 2,350 | 94 | 830 | 42 | 14 | 4 | 10.60 |
| 8 | South Louisiana | 3,050 | 89 | 605 | 11 | 44.2 | 6.1 | 16.17 |
| 9 | South Louisiana | 3,210 | 92 | 580 | 14 | 43.9 | 6.2 | 16.43 |
| 10 | South Louisiana | 2,830 | 82 | 805 | 20 | 49.8 | 13.2 | 34.98 |
| 11 | North Louisiana | 1,680 | 80 | 500 | 42 | 223 | 12 | 31.80 |
| 12 | So. Mississippi | 2,960 | 85 | 465 | 10.5 | 89.5 | 13.7 | 36.30 |

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Wherever resistance to chemicals is a *requisite*, specify GARLOCK's *Teflon* packings for use on valves, pump rods or shafts and *Teflon* gaskets for all types of flanged joints.

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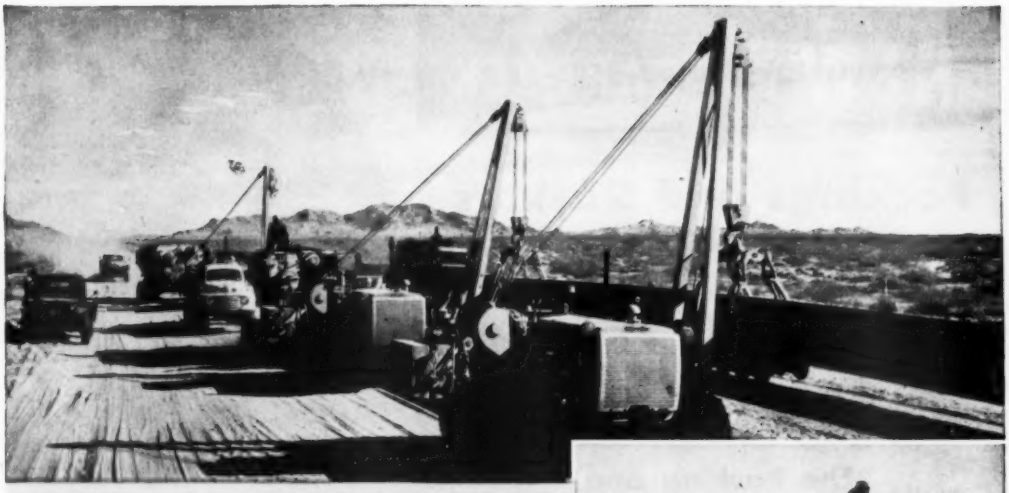

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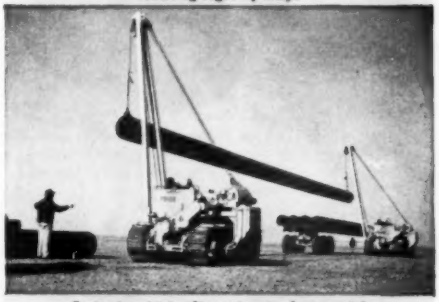

*Stringing 31-in. line pipe in desert with Trackson MD8 PIPE LAYERS.*

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uary of this year have even indicated that the weathering loss from the stock-tank liquid recovered from this type operation is less than from the conventional heater and stage-separation installation. Since such widely varying factors as well-stream composition, operating pressures, and temperatures have considerable influence on the stability characteristics of the stock-tank liquid, it would be erroneous to conclude that the weathering losses would be less when based on a few tests; however, experience does point to the fact that it is within reason to state that the storage losses from the system under discussion compare favorably to those experienced with heater and stage-separation operation.

Another question which would be of concern to an operator of a low-temperature-separation unit is: how does the hydrocarbon liquid recovery vary with pressure and temperature?

In an effort to establish this relationship we have calculated the stock-tank liquid recovery as a function of (1) pressure over a range of from 200 to 1,400 psi. and of (2) temperature over a range of from 70° to 10° F. This calculated study encompassed three different well-stream compositions ranging from a low of approximately 10 bbl. per million cubic feet to a high of approximately 100 bbl. per million cubic feet. The relationship was found to be uniform for the three compositions under study.

Fig. 3 presents calculated data on the gas stream having a content of around 50 bbl. per million cubic feet. The optimum recovery pressure at 70° F. occurs in the region of from 600 to 700 psi. It should be noted that the maximum stock-tank liquid recovery occurs at lower pressures as the temperature decreases. As an example, the optimum pressure at an operating temperature of 10° F. is in the region of 350 to 400 psi., as compared to 600 to 700 psi. at 70° F.

Experience with well over 60 of these units has shown that the calculated increased liquid recoveries presented in Fig. 3 are conservative. A reference to the observed comparison of the 12 units reported in Table 2 indicate the lowest increase on comparable compositions was 6 bbl. per million cubic feet, whereas the increase as reflected at 600 psi. between 70° and 10° F. on Fig. 3 amounts to about 3 bbl. per million cubic feet. An evaluation based on Fig. 3 has a considerable degree of safety.

### Dehydration Effect

Early experiences with the operation of low-temperature-separation units indicated that the water-vapor content of the gas leaving the low-temperature separator was below that which would normally be expected from the unit if strictly equilibrium temperature and water-vapor dew-point conditions existed.

Observed water-vapor dew points of the effluent gas have ranged from 8° to 18° F. below the observed operating temperature. Fig. 4 presents composite data taken at random from units operating at various pressures and temperatures. Average dew-point depression below operation temperatures as indicated in Fig. 4 amounted to 13° or 14° F.

Experiences and observations with respect to the dehydration ability of hydrocarbon hydrates in connection with the operation of a gas refrigeration process have been reported by E. G. Hammerschmidt.[1] His findings indicated that as soon as hydrates were deposited in the tubes of the chiller, the water-vapor dew points of the gas leaving this heat exchanger were 13° F. below the effluent temperature of the gas.

The dew-point depression is explained by Hammerschmidt on the basis that the hydrates have a lower vapor pressure than does liquid water at the same temperature, and therefore, less water in the vapor phase is required for equilibrium conditions between hydrates and vapor than for an equilibrium between liquid water and vapor.

The conditions existing in a low-temperature separator operating under conditions favorable to hydrate formation closely parallel those existing in the chiller operated by Hammerschmidt and the average dew-point depressions experienced have also been comparable.

Gas-purchase contracts where the gas is being delivered to high-pressure transmission lines often includes a maximum water-vapor-content specification. A specification of 7 lb. of water vapor per million cubic feet of gas is typical. A reference to the published water vapor content curves of natural gas at saturation as a function of pressure and temperature indicated that at 800 psi. the dew-point requirement for 7-lb. gas would be approximately 27° F. At a gas delivery pressure of 400 psi. the water-vapor dew point to meet this specification would be approximately 14° F. The operating temperature of the low-temperature separators to obtain contract specification gas for these two conditions would be approximately 37° and 24° F., respectively, based on an average dew-point depression of 10° F. These operating temperatures are well within the limits of this low-temperature unit when used on gas wells having minimum flowing pressures at the required delivery rates of approximately 1,800 and 1,600 psi. respectively for the two delivery-pressure conditions of 800 and 400 psi.

It should be emphasized that the dew-point depression below equilibrium conditions is only obtained when the low-temperature separator is operating under conditions favorable to hydrate formation. Reference to Fig. 4 shows that the line of equal tem-

*(Continued on page 84)*

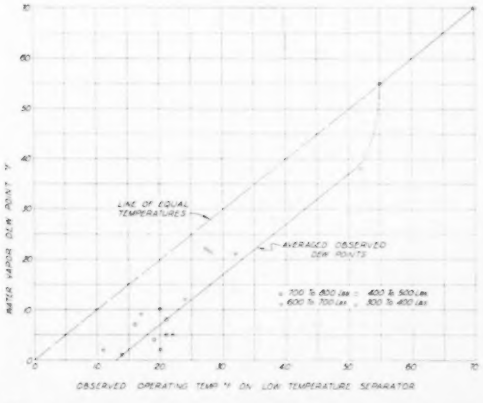



*Fig. 4—Average dew-point depression below operating temperature.*

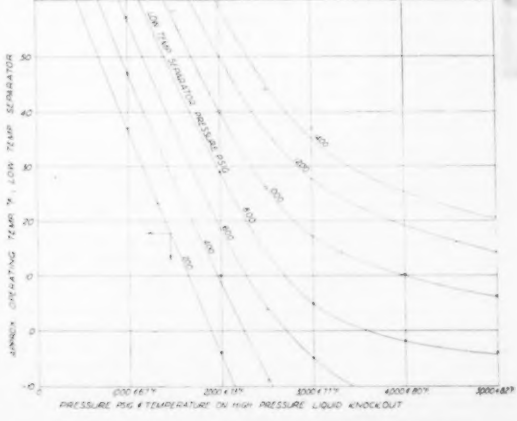
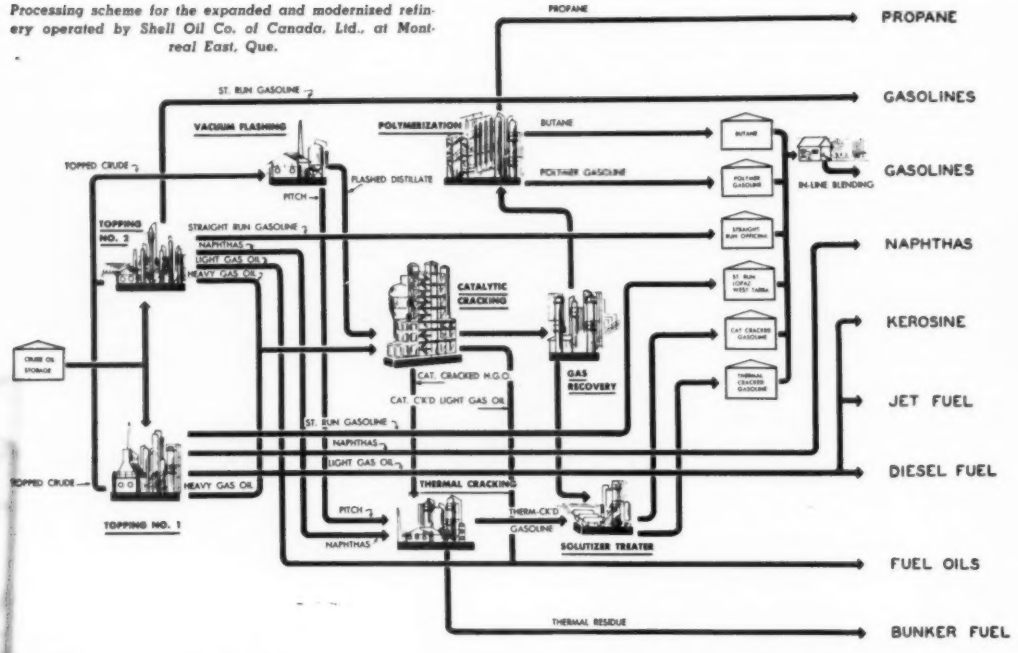



*Fig. 5—Prediction of approximate operating temperature.*




*Processing scheme for the expanded and modernized refinery operated by Shell Oil Co. of Canada, Ltd., at Montreal East, Que.*

# Shell's Building Program at Montreal East Refinery Ups Input to 25,000 Bbl. Daily

## Capacity increased 80 per cent over previous rating

COMPLETION of a multimillion-dollar building program at its Montreal East refinery places Shell Oil Co. of Canada, Ltd., in an important position in Quebec's refining picture. Crude-oil capacity of the expanded and modernized plant is rated at 25,000 bbl. daily, a setup of nearly 80 per cent over its previous crude-oil input rating.

Three major processing units were constructed under the program at Montreal East. These included a new catalytic cracking plant, a vacuum flasher, and an additional crude-oil distillation unit. Work at the refinery was started just a little more than 2 years ago and in addition to installation of new major processing units involved conversion of existing thermal cracking facilities, and modifications to a polymerization plant. Further work involved extension of steam-generating and other auxiliary facilities, erection of 26,000,000 gal. of new additional storage capacity, and an in-line blending plant along with various new buildings for laboratory, administration, and other occupancy.

The existing topping unit at the refinery, rated at 14,000 bbl. daily, was completely modernized. This revamped unit along with the new topper insures continuous operating of the refinery at its new rating of 25,000 bbl. of crude oil daily.

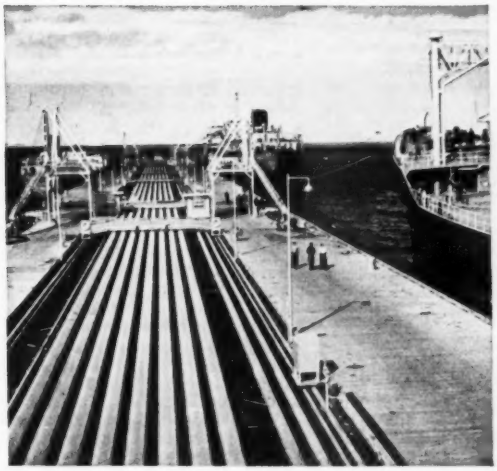
Feed for the new cat cracker is provided, in part, with operations of the new vacuum flasher. Bottoms from this vacuum unit go to the modernized thermal cracking plant.

During the 2-year construction period the refinery was kept on continuous operation except for a 2-week shutdown for tying in the new facilities. Because of the severe winters in the area construction operations were scheduled to allow excavation and installation of concrete to be carried out in the milder weather seasons. This work was completed on time and all major equipment items were installed before severe cold weather set in the following year. In many instances construction schedules were exceeded by 2 or 3 months and by greater margins in a number of cases. As an example the thermal cracker, scheduled for completion in the fall of last year, was completed in June of that year.

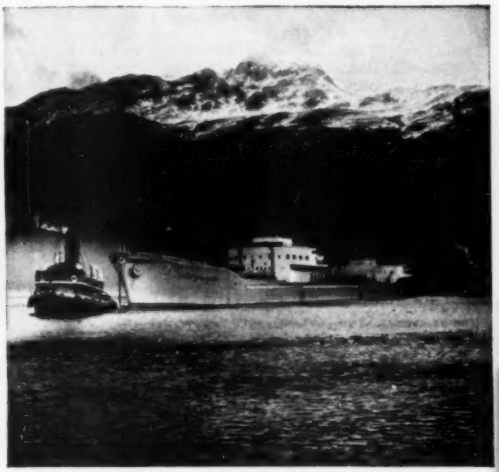
Other construction difficulties brought about by climatic conditions involved completion of the cat cracker regenerator before arrival of freezing weather. This vessel, weighing 115 tons, was shop fabricated and barged via the St. Lawrence River to a point near the refinery, then transported overland to the refinery site. Transportation was completed just a few days before start of the winter freeze, allowing the regenerator to be installed on schedule.

Design of the catalytic cracking unit is one of the most compact of its type to date. The plant, completely heat balanced, is not equipped with preheaters or catalyst coolers. Due to a major revision in the unit's catalyst transfer method, height of the over-all structure has been reduced to 118 ft. Neither reactor or regenerator risers are employed and

# Travelling far and fast

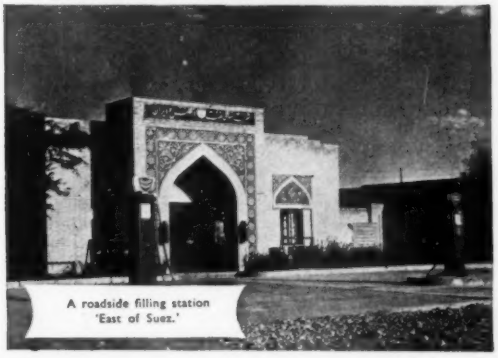


**The perpetual motion of oil** on its complicated journey from field to filling station is being accelerated constantly by Anglo-Iranian's international transport organisation. Above is a view of an oil-loading jetty where tankers are now loaded at more than 26,800 barrels per hour.



**The first cargo of oil** arrived in February this year at Anglo-Iranian's new deep-water, off-loading installation at Finnart on Loch Long, Scotland. From here the oil makes a coast-to-coast journey by pipeline to Grangemouth refinery.

Many famous international airlines are regularly served by the BP Aviation Service.



A roadside filling station 'East of Suez.'

## First and Biggest

oil producers in the Middle East since 1912, Anglo-Iranian Oil Company and its associated companies also operate thirteen refineries in Europe, Middle East and Australia; their sales organisation includes major marketing or supply interests in Europe, Asia, Africa and Australasia, with international ships' bunkering and aviation services.

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because oil injection is directly to the catalyst bed the reactor grid is eliminated.

Input fresh feed capacity of the cat cracker is 10,000 bbl. daily, design basis. This rating is on 55 per cent conversion of the charge which is made up of 75 per cent vacuum-flashed distillate and 25 per cent gas oil from topping-unit operations. Circulation of a new microspheroidal synthetic silica alumina catalyst is at the rate of 13.5 tons per minute.

### Automatic Controls

The cat cracking unit is equipped with an elaborate automatic shutdown system. All vital elements (except air blower and air stream to regenerator) shut down in event of process emergency. If air system fails anywhere then air blower and air stream shut down, as well as whole unit. Every device does not stop instantaneously, but in the proper time sequence.

Extreme weather conditions have required housing of most operating equipment such as pumps, exchangers, etc. This in turn provides a safety problem which has been met by a network of explosibility alarms —18 stations throughout the building.

An analyzer on the air inlet to the control room functions continuously wtih a separate alarm system. If the pressuring air becomes contaminated with combustible materials, this unit not only sounds an alarm but shuts down the pressurizing fan.

An automatic gasoline - blending system provides continuous blending in a single line of the six hydrocarbon components of gasoline, tetraethyl lead, dye, and inhibitor, then routes the finished product direct to ship and other loading.

Each of the six hydrocarbon components is flow controlled at a rate predetermined by laboratory formulation and analysis. A special calibrated transmitter flashes messages up to 2,500 ft. to recording instruments. Each receiver is equipped with very accurate remote index setting device which transmits back to a remote controller located in the flow transmitter. This controller in turn regulates valve in close proximity so little time lag occurs.

The combustible-gas-detection and alarm systems installed in Shell's new refinery have already been tested for reliability and practicability in 2 years' operation on Shell's Wood River, Ill.-East Chicago, Ind., pipe line. The detection systems were installed at five diesel-powered pumping stations on the pipe line which handles 17 different products. The alarms had been in use for 2 years and subject to rigorous test, before Shell installed them at Montreal. The system continuously samples the air and records its analysis to detect any concentrations of its inflammable vapors. By this safeguard, diesel engines and pumps can be installed in the same room without fire or explosion hazard.

Housed in an explosion-resisting case and equipped with flashback arresters, each analyzing apparatus is mounted on the main instrument panel. A $\frac{3}{8}$-in. copper tube carries air samples from the space around double mechanical seals of the pump to the analyzing instrument. A turbo-compressor with explosionproof motor draws the air samples to the analyzer.

Currently the expanded and modernized refinery yields gasolines, liquefied refinery gases, naphthas, and distillate and heavy fuel oils. The gasolines are divided into aviation and motor grades. Other fuels produced at Montreal East include jet and diesel in the middle range. Kerosine fuels are also produced in the Shell plant plus the heavier grades of commercial fuel oils and including bunker stocks.

## Aluminum Marine Pipe Line

*(Continued from page 59)*

between the riser and the line. Aluminum swivel joints of the same type and pressure rating were not available in the 4-in. size at the time of installation, necessitating the use of 6-in. to 4-in. 61S-T6 reducers. Steel swivel joints were used in the steel part of the risers above the water line.

One-half of the aluminum line was left bare and the other half was coated. The coating consisted of a primer, two coats of pipe-line enamel, one wrap of glass-fiber tape, and a final wrap of kraft paper.

### Construction

The pipe-line contractor did all the work except the welding, which was performed by Alcoa. The pipe was welded into 400-ft. sections on shore. The inert-gas metal-arc welding process was employed, using argon gas, a $\frac{3}{16}$-in. diameter tungsten electrode and a $\frac{1}{16}$-in. diameter 43S weld wire. The welding machine was a portable, gasoline-driven, self-contained unit.

An internal-expanding stainless-steel backing ring was used for the first seven welds, but the remainder were made without a backing ring An external line-up clamp and a wind screen to protect the argon-gas umbrella completed the auxiliary equipment.

All welding was done in the downhand position by rotating the pipe under the welding torch. The ends of the pipe were thoroughly cleaned with steel wool and carbon tetrachloride before welding.

After welding, each 400-ft. section was tested at 1,000 psi. hydrostatic pressure and no leaks or evidence of unsatisfactory welds were found. Each welded joint was then coated, wrapped, and covered with a 441-lb. concrete river weight. This resulted in a negative buoyancy of 3 lb. per foot.

Flanged, 40-ft. inspection sections were constructed, and two of them, one coated and one uncoated, were placed in the line. Another pair will be kept in storage for use during future inspection periods.

In welding the reducers to the swivel joints, the joints were disassembled to reduce bulk and to prevent damage to the rubber gasket. No apparent difficulty was encountered during or after welding.

In launching, the 400-ft. sections with pontoons were placed on skids on a lubricated runway and towed off by boat. As the end of each section reached the water line, another section was placed on the runway and welded to the first until the desired length was reached. In this manner, the completed 1,800-ft. section of bare pipe was towed to the well (approximately 5 miles out in the bay) and anchored by releasing the pontoons.

The 1,700-ft. section of coated pipe, excluding the swivel joint of one 40-ft. section, was towed to the metering platform and anchored there. The ends of the bare and coated pipes were raised by using tackle on the decks of two boats, and were then placed on a barge and bolted together. The riser sections, both bare and coated, were then flanged to the line and to the well and platform risers, respectively.

When gas pressure was applied, it was found necessary to repair two welds. This was done by raising the pipe to the deck of the barge and welding.

### Results

The installation of this pipe line showed that offshore aluminum lines are practical, although there are some considerations that differ for aluminum and steel. Steel lines are coated, wrapped, and cathodically protected. Aluminum lines are lighter and easier to handle, but require a greater number of river weights. Also, care must be taken not to overstress the welds during launching.

The cost of the aluminum line, excluding the coating on one half of it, was almost identical to the cost of a comparable steel line coated and wrapped. Any increased life or reduced maintenance, therefore, would give aluminum pipe an economic advantage.

Construction of the aluminum line was completed on February 23, 1950, but the well was not tied in until May 17, 1950. Visual inspection of the line at that time showed that it was thoroughly coated with marine growth, but no apparent attack on the aluminum could be found under the growth.

Periodic inspections of the line will be made to determine how well it is standing up. In view of the wealth of data available on aluminum under similar exposures, Alcoa is optimistic about the life of the line. The oil and gas industry is watching the performance of this first aluminum offshore gas line with interest because of the growth of offshore production.

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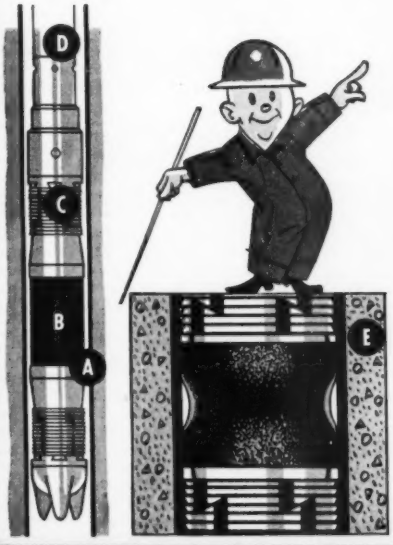
# LANE WELLS

## DRILLABLE BRIDGING PLUGS

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**B** Longer sealing element—for leakproof pack-off.

**C** These BIG interlocking slips hold fast on any casing without casing damage.

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# WATER-FLOOD OIL RECOVERY

## *in Washington County, Oklahoma*

## 5. C. R. A. Hicks Unit and No. 2 Unit Project

**by C. H. Riggs* and William C. Smith***

*Petroleum engineer, U. S. Bureau of Mines Petroleum Experiment Station, Bartlesville, Okla.

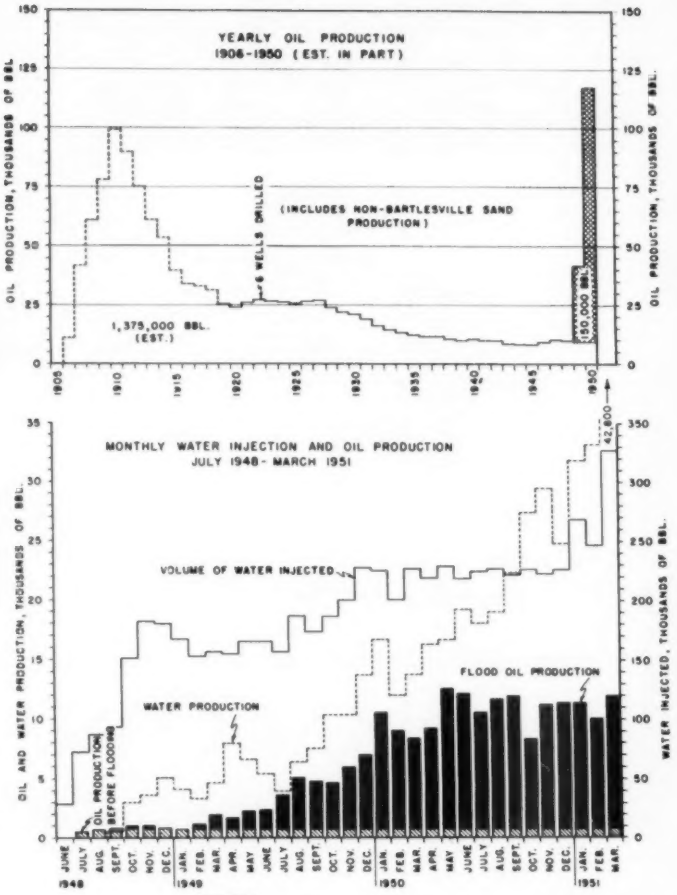


*Fig. 1—(Above) Production history of Cooperative Refinery Association Hicks Unit and No. 2 Unit project, Washington County, Oklahoma.*

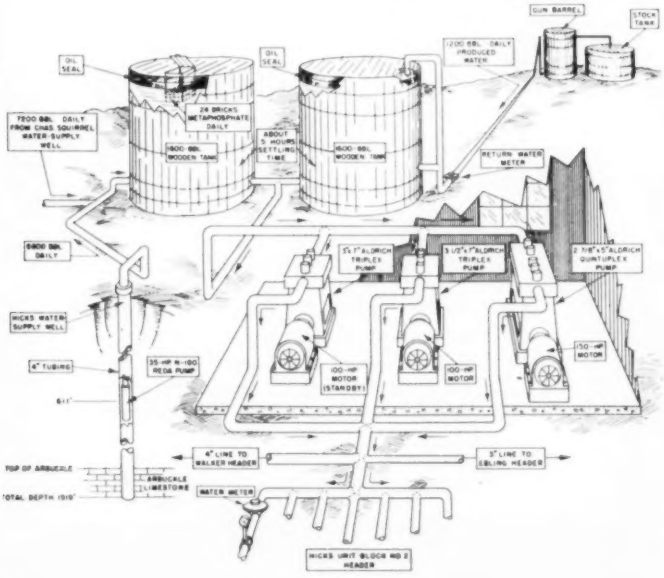


*Fig. 2—(Left) Closed-system water plant, Hicks Unit and No. 2 Unit.*

THE Cooperative Refinery Association Hicks and No. 2 Units comprise 245 developed acres on 6 leases totaling 320 acres. These leases are all in 13-27n-12e, approximately 4 miles north of Bartlesville, Okla., in Bartlesville-Dewey field.

Production is obtained from both the Bartlesville and Wayside sands but only the former is being flooded. The Bartlesville sand is at a depth of approximately 1,300 ft. (610 ft. below sea level) in this area. The thickness of oil-saturated sand varies from 12 to 41 ft. and averages 20 ft. Available core analyses indicate the weighted average porosity of the oil sand is 18 per cent, the oil saturation 30 per cent, and the water saturation 40 per cent. The average effective permeability is 30 md.

**Early development of leases.**—The

leases included in the project originally were developed in 1906 and 1907, and the initial production from individual wells ranged from 15 to 50 bbl. of oil daily. Because complete records of early production from all the six flooded leases are not available, the graph of yearly oil production from the two 80-acre Hicks leases, between 1906-17 was used as a guide to extrapolate the graphs of each of the other included leases. The yearly oil production as indicated by each of the individual graphs, was combined to construct the composite curve (Fig. 1) for the entire 320-acre tract. On these leases, oil was produced into the same tank batteries from both Wayside and Bartlesville sands and since it is impossible to segregate the production from the Bartlesville sand, the graph (Fig. 1) shows yearly oil production from both sands. No secondary-recovery methods of production were applied before water-flooding operations were started.

### Water-Flood Development

The Cooperative Refinery Asociation obtained permits from the Oklahoma Corporation Commision on January 20 and July 19, 1948, to water flood several leases in Washington County, Oklahoma, including the leases in the Hicks and No. 2 units. All but two of the original Bartlesville sand wells and all of the Wayside wells on the leases in the project were plugged with cement and the property then was redrilled for water flooding. This development was started in 1947 using a five-spot pattern with a spacing of 660 ft. between like wells.

Water was first injected in June 1948 using 21 input wells, and the first increase in oil production occurred in August 1948. Development of the flood was still in progress in April 1951.

**Drilling and completion.**—Twenty-five input wells were drilled and completed with 1½-in. cement-lined tubing set on a packer at the top of the oil sand and each cemented with 20 sacks of cement. Only the first few input wells drilled were shot. Twenty new producing wells were drilled and completed with 4½-in. casing which was set on rag packers and cemented with 25 sacks of cement. These wells were shot with 2 qt. of nitroglycerin per foot of sand. Two old wells were reconditioned and now are being used as producing wells. The producing wells are pumped with individual pumping units each driven by 5 or 7½-hp. electric motors.

### Water-Pressure Plant

Water for injection is obtained from two water-supply wells completed in the Roubidoux section of the Arbuckle limestone at a total depth of approximately 2,000 ft. The water plant is of the closed type (Fig. 2). It processes approximately 12,700 bbl. of water per day of which 8,800 bbl. is injected into wells on the Hicks Unit and No. 2 Unit project.

Water from the supply wells and the produced water is pumped into two 1,600-bbl. wooden tanks in which oil seals are maintained to prevent the water from being exposed to the air. The water is treated in these tanks with sodium hexametaphosphate and then is pumped directly into the input wells by an Aldrich vertical quintuplex pump, and an Aldrich vertical triplex pump powered by 150 and 100-hp. electric motors, respectively. Another triplex pump is maintained for standby service. The pressure developed by injection pumps is approximately 700 psi.

**Water-flood data.**—Between June 1948, when water injection was started, and April 1, 1951, approximately 6,402,770 bbl. of water was injected at well-head pressures ranging up to 600 psi. The rate of water injection reached 5,500 bbl. daily late in 1948, and late in 1949 it was increased to approximately 7,300 bbl. daily (Fig. 1). The injection rate was increased again early in 1951, so that by March approximately 8,800 bbl. of water was being injected daily into the Bartlesville sand through the 24 injection wells.

Although the first increase in the rate of oil production came in August 1948, the increase was slight until February 1949. After February, the monthly oil production increased more rapidly, reaching a peak in May 1950 of approximately 12,600 bbl. (400 bbl. daily). There has been little decrease in monthly oil production since that time (Fig. 1).

Water production began to increase slowly in September 1948, but since September 1949 the increase has been more rapid. In March 1951 approximately three times as much water as oil was being produced.

Fig. 1 shows the increased monthly production (solid black) resulting from water flooding, over and above the former producing rate (cross-hatched). The cumulative oil production from the start of water flooding to April 1, 1951, was approximately 208,274 bbl. and the increased oil production, attributable to water flooding, is estimated to be 181,474 bbl. or 741 bbl. per acre. A total of 6,402,770 bbl. of water had been injected and the ratio of total water injected to increased oil production was 35.3.

## Houdriforming

*(Continued from page 62)*

with this catalyst which causes catalyst deposit formation requiring frequent regeneration. Curves B and C were obtained with different Houdriforming catalysts; B has only a dehydrogenation function whereas C has both dehydrogenation and isomerization functions. The differences between these catalysts become most apparent at high octane numbers. It is quite striking also that a 78 volume per cent yield of $C_5$+ 3-lb. R.v.p. product of 97.3 F-1 clear octane number was obtained with catalyst C.

All yields and octane numbers in Fig. 7 are for $C_5$-free gasoline of about 3 lb. R.v.p. Considerable outside butane may be added to bring the gasoline to 10 lb. R.v.p. Over-all yield and, to a certain extent, octane numbers are thereby raised. Catalyst C under proper conditions can produce enough butane to obtain 10-lb. R.v.p. gasoline. However, catalyst B under all operating conditions and catalyst C under mild conditions give products to which outside butane must be added. Butane produced in Houdriforming and the outside butane required thus compensate for most or all of the volume loss suffered in converting the naphthenes to aromatics. Indeed, as shown in Table 4, the 10-lb. R.v.p. gasoline may amount to 100 volume per cent plus of the charge when utilizing added butane.

Since outside butanes are available in most refineries, it is very desirable to eliminate hydrocracking as far as possible. In the event that butanes are required for the production of 10-lb. R.v.p. gasoline, hydrocracking can be effected.

In Table 4 are shown yields and octane numbers obtained by Houdriforming East Texas-type naphtha (previously described) at three sets of operating conditions. These data illustrate how an increase in severity of operating conditions will raise octane number at expense of yield. At desirable operating conditions the usable catalyst life is principally a function of external poisoning by impurities in the feed stock. With proper control of these no loss in activity has been experienced in pilot-plant runs.

### Acknowledgment

The development of the Houdriforming catalysts is the result of the fundamental research which Houdry Process Corp. has carried on for a number of years. Heinz Heinemann, T. H. Milliken, G. A. Mills, and A. G. Oblad are primarily responsible for the success of this program. It is appropriate that credit be given to J. C. Dart, J. W. Schall, T. A. Burtis, and D. H. Stevenson for the successful pilot-plant development of the Houdriforming process. The contributions of other members of the staff are also acknowledged.

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# CORROSION and its control

## Insulated Joints in Cathodic Protection

INSULATED joints serve two purposes in the cathodic protection of underground structures—those of isolation and of sectionalization. The first term is used to mean the separation of the structure to be protected from others which would impose an excessive drain on the system, whether they be of the same ownership or not. Sectionalization is used to refer to the separation of a structure or group of structures into units for protection, either because characteristic differences require different current densities, or merely to simplify either the somewhat complex job of determining current requirements or the distribution of costs between sections for accounting purposes. In addition to these two primary purposes, there will occasionally be a chance to take advantage of the presence of an insulated joint by partially bypassing it with a resistor, so as to control the amount of current which is allowed to flow from one section to another.

By far the commonest use of such joints, however, is that of isolation. In order to protect some specific structure with reasonable costs, it is necessary to separate it from others whose protection is not desired. Frequently the extraneous structure has an area—and hence a current demand—far greater than the one in which we are interested, so that its connection to the system would multiply the costs many times over. An example of this kind might be a small plant—say a products terminal—which is tied in by a 4-in. line to a large, totally bare, cast-iron water main. The current drained off in a vain attempt to protect this enormous area of bare metal could be 50 times that required to protect the coated lines within the terminal itself.

The tank bottoms at crude-oil pipeline stations occupy a similar position with respect to the pipe lines themselves; if the stations are not isolated from the line, a large part of the protective current will be diverted to the tank bottoms and station piping. The protection of these structures should either be made the object of a separate system, or a resistor may be used across the insulated joint to drain off just enough current to prevent interference damage to the station structures.

Unfortunately for the corrosion engineer, pipes are not the only metallic connections which may exist between the structure whose protection is being sought and parasitic structures. Walkways, fences, railroad tracks, braces, and guy wires are known offenders in this respect. Often the tracking down and eliminating of these drains take up the major portion of the time required by a project, particularly on old and extensively remodeled facilities. Abandoned lines, not shown on records, and often remembered only by the oldest pipe liners, are common causes of difficulty. If a current requirement test is being run, as is often the case, quite commonly a welding machine is being employed as a source of energy. Although the output of such a machine is direct current, it always has a fairly strong alternating component, and this results in a strong and easily recognizable signal throughout the structure to which the machine is connected. This signal can easily be traced with the receiver unit of a pipe-line locater, and may greatly facilitate the finding of parasitic drains.

### Ingenuity Needed

Clearing these unwanted connections, once they have been found, often calls for all the ingenuity available. Fortunately the voltage involved is very low, so any nominally insulating material with the needed mechanical properties will serve. Piping may be insulated from saddle supports by short sections of old tires; wooden sections may be inserted in various structures as may be required; standardized insulating material is available for railroad tracks. One word of caution—although the voltage involved is low, the extremely low resistance to ground of extensive metallic structures may mean that a current of several amperes can flow through an accidental short circuit, such as contact with a wrench or other tool—and the interruption of this current can cause an arc or spark capable of igniting inflammable vapors. For this reason thought should be given to the location of these insulated joints.

It is difficult to predict in advance all of the places where an insulated joint might be necessary or convenient; it is difficult and expensive to install insulation in an existing joint; where a joint is insulated, but not needed, it is comparatively simple to short circuit it. For all of these reasons, it is strongly recommended that insulating material be installed liberally in the construction of a new line. Even where a joint is required to be conductive, the presence of insulation may greatly facilitate the corrosion engineer's work, for the temporary isolation of sections of line can make the determination of current requirements much simpler, and can frequently save a great deal of time in the tracking down of trouble.

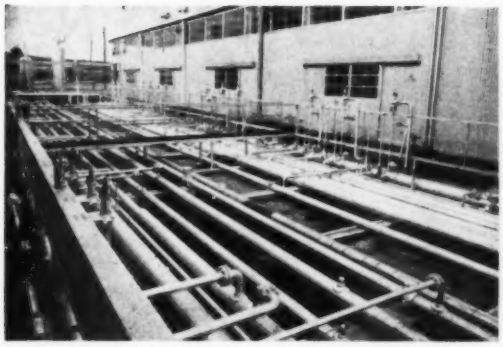
### Use Insulated Wire

Where such joints are buried, two heavy leads (No. 10 copper wire or larger) should be connected to the two sides of the joint and brought up either in a marker, or buried just below the surface at a carefully recorded location. Insulated wire should be used, and the connection to the pipe must be well coated; in the absence of cathodic protection, or in the event of temporary failure, there will be a possibility of galvanic action between the steel pipe and the copper wire, to the disadvantage of the pipe.

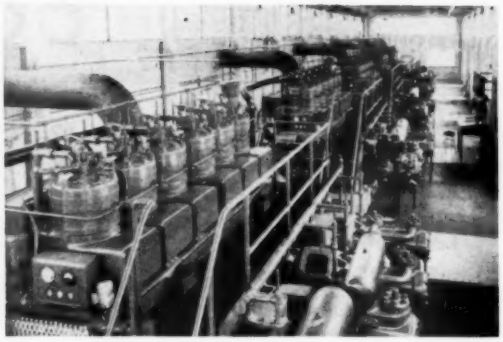
An insulated joint in a valve box, or in exposed piping, should be equipped with a similar pair of leads; bare wire may be used, however, and the leads may be only long enough to permit an easy connection to be made when needed.

If the operating personnel at a pumping station is supplied with a low-range voltmeter, it will be possible for them to make a daily check on the voltage indicated across the insulated joints which isolate the station from the pipe line. A zero voltage would indicate a short-circuited joint; if the joint is sound, the reading will be indicative of the operating status of the cathodic protection system. It is suggested that a rugged inexpensive instrument be used for this purpose—the potentials indicated may not be true values, but when the same instrument is used at the same location, the corrosion engineer will be able to calibrate the installation and instruct the operating personnel as to the range of values which should be reported; normal readings should be recorded in the daily station log, where they can be inspected from time to time.

**Part 18 of a series by Marshall E. Parker, consulting engineer, Houston.**



*Headers and laterals for the Coalinga Nose plant are located between the new and original compressor buildings.*



*Five new compressors were added to unitized operation increasing total compressor horsepower to 5,680 for entire plant.*

## Simple design of Coalinga Nose compressor plant provides

# Vibration-Free Compressor Piping

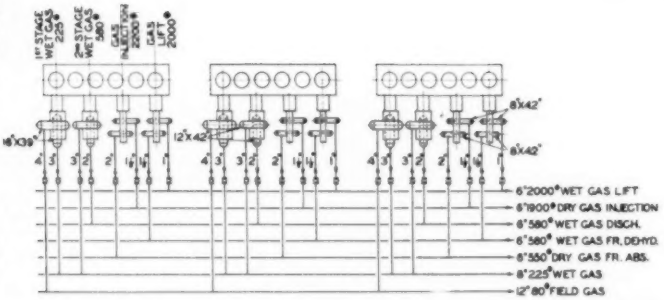



*Fig. 1—Compressor-plant piping arrangement for pressure-maintenance and gas-lift operations.*

THE discovery of oil on Coalinga Nose in the San Joaquin Valley of California, northwest of Kettleman Hills, resulted in the development of one of the most prolific fields in California where the Gatchel sand in three zones produces an average of 38,400 bbl. of 30° A.P.I. oil daily from 9,000 ft. Shortly after the limits of the field were defined, the individual operators began a series of discussions of a plan for a fully unitized property. The participating companies are: Los Nietos, Standard of California, Superior Oil Co., Honolulu Oil Corp., Seaboard Oil Co., and The Texas Co.

Unitization of the pool was quite desirable from a lifting-cost stand-

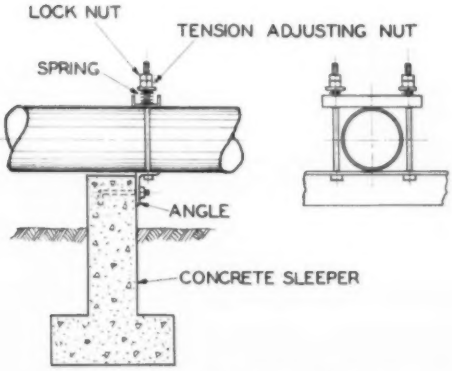
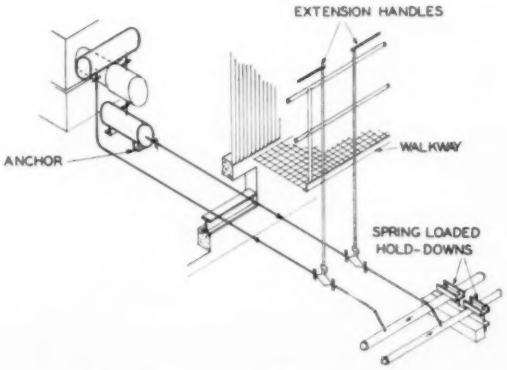
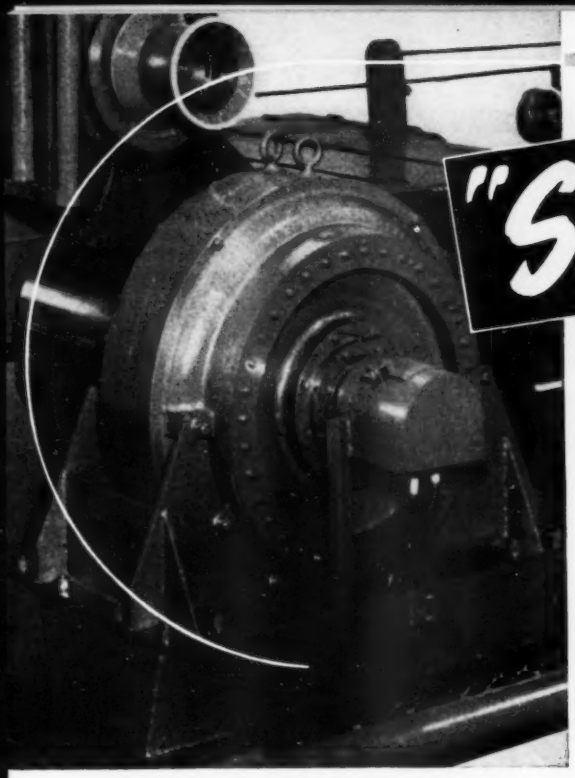



*Fig. 2—Typical spring-loaded hold-down.*




*Schematic arrangement of compressor piping.*



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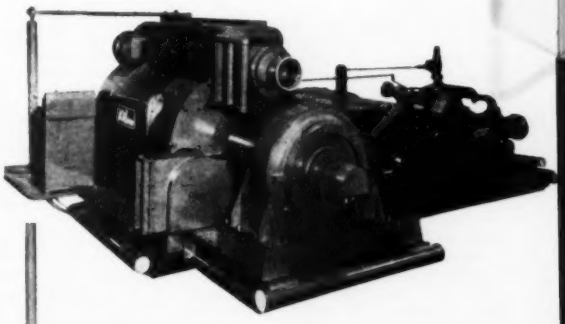

• Wilson Steamair Drawworks equipped with the new Parkersburg "Super 46" Hydromatic.

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point. Also of importance was the anticipation of greater ultimate production and the resultant conservation of a natural resource. The gas-oil ratio on March 1, 1950, was approximately 850 cu. ft. per barrel of crude oil produced. This gas was being processed in a conventional absorption plant of recent design operated by Union Oil Co. for Los Nietos Co., and the residue gas was shipped out of the field as domestic and industrial fuel. Unitization of the property would return all of the gas, less gasoline extracted, back to the formation to maintain the existing formation pressure.

When all details had been worked out on the unitization plan, the engineering group decided that plant compression facilities should be increased so as to provide capacity to handle wet gas coming from the field at 80 and 225 psig., and compressing it to 580 psig. At this pressure the wet gas is to be processed in the absorption plant, and the dry gas from this operation, approximately 25,000 M.c.f. daily, would be compressed to about 2,000 psig. for injection into the formation. A capacity of 12,000 M.c.f. daily for gas-lift operation would also be included. This gas-lift cycle utilizes the 580-psig. wet gas, compressing it to 1,900 psig.

The original compressor station in the gasoline plant contained five 300-hp. and two 600-hp. gas-engine-driven units which were inadequate in volume handling capacity to produce the results desired in the unit plan. So that the necessary volume of gas at the desired pressures might be handled, the station was increased to a total of 5,680 hp. by adding three 660-hp. and two 500-hp. units. The new engine room was to be constructed parallel to the original compressor building with the headers and pipe lines between the facing compressors.

Design of the new facilities was made by J. B. Gill Co., constructors and engineers of Long Beach and Tulsa. Bids submitted for construction resulted in the Gill company being awarded the contract. Design of the new facilities included rearranging and grouping the compressor cylinders in the older unit so that compression ranges would be distributed throughout the total number of engines. This was done to prevent loss of operation of any of the pressures, should one or more engines be shut down.

Headers and laterals in the plant were designed to reduce vibration due to pulsation. By referring to Fig. 1 "Typical Compressor Piping Arrangement," it may be seen that seven separate headers are employed, ranging downward in size from 12 to 6-in. diameter. Suction and discharge laterals leading to and from the engines range in size from 4 to 1 in. Cylinders taking suction on the 80-psig. field gas are 10-in. bore and 14-in. stroke. The second-stage cylinders taking suction at 225 psig. and discharging to 580 psig. are 7-in. bore 14-in. stroke, while the cylinder diameter on both the 1,900 and 2,000-psig. discharge systems are 4⅞ in. in diameter, some of which are single acting, and others double acting. On these high-stage services the double-acting small-diameter cylinders take suction through 2-in. lines and discharge into 1½-in. pipe, while the single-acting cylinders take suction through 1½-in. lines and discharge through 1-in. pipe.

Design of the intake and discharge headers between the two engine rooms provides freedom for longitudinal movement. The lines are supported aboveground where they are readily accessible for maintenance and repair. Only spring loaded "holddowns" are used on the sleepers to hold the piping headers in place in such a manner they can move horizontally under the forces of contraction and expansion due to temperature changes (see Fig. 2).

Jacket cooling is supplied by a closed system to exclude all scale and corrosive material. Cooling of the jacket water and gas lift gas is provided with aerial units, having fans driven by multicylinder gas engines. Dehydration of the wet gas utilized in the gas-lift operation is accomplished at 580 psig. with a glycol unit designed by Industrial Engineers, of Los Angeles. The moisture is removed in this pressure stage to prevent hydrates from forming in the higher discharge lines in the control equipment at the gas-lift wells. The injection gas temperature is controlled by cooling sections in the existing atmospheric water-cooling tower.

## Tough Drilling

*(Continued from page 67)*

Coast makes rig skidding exceptionally difficult and a little-used technique. However, Shell Oil Co. has recently adopted rig skidding in its important Wilcox discovery, the Gohlke field.

Over a million pounds of equipment was moved from one location to another in one working day when Shell's rig No. 2 on 1 Musselman at Gohlke field, South Texas, was skidded about a mile and a half to its new location at 2 Helen Gohlke.

Moving the derrick intact by means of self-laying tracks, thereby eliminating the time and expense involved in dismantling and rigging up, saved 4-5 working days and 75 per cent monetary costs at this particular job.

### Offshore

Although drilling activity has been dormant in the tidelands area during the current state-vs.-federal ownership controversy, the operators will be faced with the same difficulties attendant in offshore operations once drilling is resumed.

The building of drilling platforms, the transporting of equipment and supplies, the limited working space available to the crew, and the hazards due to weather conditions all lend to the complexities of drilling offshore and add to the costs of such operations.

### Directional Drilling

The vagaries of the Mississippi River as it meanders between Louisiana and Mississippi, adds to the headaches of the drilling crews. Platforms in the river can become navigational hazards, and then there are the problems of swirling currents and flood waters.

Humble had a lease fall at the bottom of the river adjoining its Avondale field, Louisiana, production. To get to it, crews had to drill to a target 200 ft. in diameter, 1,160 ft. north from the rig, and 8,200 ft. down.

Directional drilling was begun at 3,600 ft., and a spud bit and two whipstocks were used to guide the hole in a gigantic spiral out under the river to 6,594 ft., where the final whipstock was set. When the bit reached the true vertical depth of 8,200 ft., a survey showed the hole to be exactly 1,160 ft. from the surface location and only 50 ft. from the objective — easily within the target area. The well was drilled on to a total depth of 9,396 ft.

The overcoming of difficult drilling problems in the Gulf Coast area is an indication of the ingenuity of the operating crews and engineers. With a total disregard for the odds against them, these crews have continually solved their problems to maintain the high productivity of this important oil-producing area.

## Low-Temperature Separation

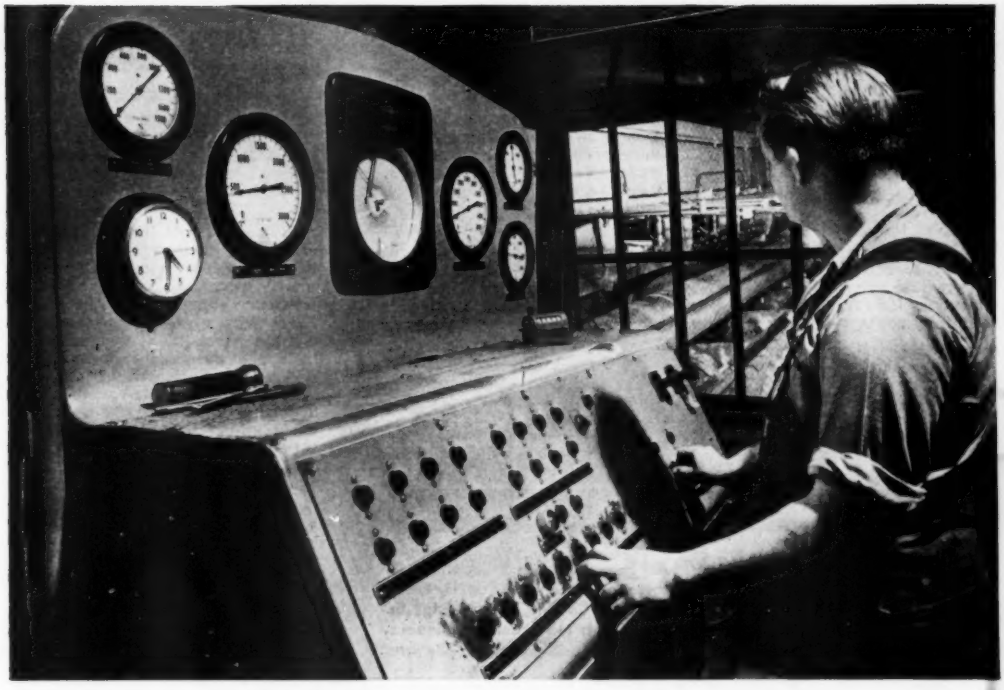
*(Continued from page 73)*

peratures and the observed dew point join in the region of 55° F. at an operating pressure of 500 psi. For pressures other than 500 psi. this junction would occur above or below this point.

In addition to finding application for the purposes of increasing liquid recovery and meeting gas-contract specification, low-temperature units are being used to accomplish a dehydration of the gas-condensate stream so the production from offshore vapor-phase reservoirs can be transported to onshore facilities at high pressures without hydrate formation in the pipe line submerged in the Gulf of Mexico.

### Application of Low-Temperature Unit

Since the system is dependent upon the expansion of the gas stream to produce the low temperatures necessary for profitable operation, it follows that some means of predicting the operating temperature from a given well-head flowing pressure



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| Type | Diameter | Length | Wall Thickness | Shipping Point |
|---|---|---|---|---|
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| Continuous Weld—Plain End | 2⅜" to 4½" O.D. | Up to 40' | Standard | Fontana, Calif. |
| Electric Resistance and Fusion Weld—Plain End | 8⅝" to 20" O.D. | Up to 40' | .188" to .500" | Napa, Calif.—Basalt-Kaiser |
| Electric Resistance Weld—Plain End | 5⅛" to 12¾" O.D. | Up to 55' | .188" to .400" | Fontana, Calif. |
| Electric Fusion Weld—Expanded—Plain End | 22" to 30" O.D. | Up to 40' | .188" to .500" | Napa, Calif.—Basalt-Kaiser |

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would be essential. The curves presented in Fig. 5 have been constructed to provide this means.

Due to the great variation in well-stream compositions the use of only one set of curves, such as presented in Fig. 5, is at best limited to an approximation of the operating temperature. To avoid a lengthy presentation of this phase of the application, a study of the actual operating data from a number of units was made, and from this study construction of the curves in Fig. 5 was accomplished.

An example of the use of the curves for predication of operating temperature is as follows: Consider the condition of having a well-head flowing pressure of 3,000 psi. and it is expected that gas-delivery pressures would be 800 psi. Fig. 5 shows that an approximate operating temperature of plus 5° F. could be expected. It would be well to emphasize that this approximation is applicable to this unit where all liquids are removed in the high-pressure knockout upstream to the choke. Inclusion of the hydrocarbon liquids in the expansion, particularly on high-content-gas streams, will require an upward adjustment of the operating temperature predications.

The temperatures indicated beside the pressures shown on the abscissa of Fig. 5 are those chosen as being just above the expected hydrate-formation temperature. It will be recalled that mention was made of the use of the heat exchanger and its controller for maintaining the temperature at this selected level. The pressure and temperature indicated are those which generally are slightly above the hydrate formation conditions for the usual types of gas streams.

Some previous mention has been made to the effect that an application of this low-temperature unit may or may not require a heater. The unit under discussion has, as indicated previously, the requirement of having the gas enter the expansion choke at a temperature above hydrate-formation conditions. The well-head flowing temperatures of gas wells vary greatly. As an example, some deep gas-condensate wells in the Gulf Coast region have flowing temperatures of approximately 165° F. at a rate of 10,000,000 cu. ft. per day, whereas there are wells in the Rocky Mountain region that are troubled with hydrate formation within the tubing through which the wells are produced.

Data on flowing temperatures as a function of delivery rates are desirable when considering the application of a low-temperature unit. It has become a common practice to record the tubing pressure at various flowing rates when testing a gas-condensate well. Flowing temperatures as a function of flowing rates proved very useful when included with these data.

The gas stream should enter the heating coil of the low-temperature separator, which is upstream to the point of expansion, at a sufficiently high enough temperature to permit the supplying of the required amount of heat to the liquid body in the vessel without lowering the temperature of the stream to hydrate-formation conditions. This heat serves the purpose of melting the hydrates and providing the necessary latent heat of vaporization to accomplish stabilization of the hydrocarbons before they are discharged to storage.

### Conclusion

Through the proper application of well-designed low-temperature-separation equipment on high-pressure gas - condensate - producing wells it may be concluded that: (1) A profitable increase in the hydrocarbon stock liquid can be accomplished, (2) the stock liquids recovered possess stability characteristics comparable to those recovered from the conventional system operating at higher temperatures, and (3) gas of low water-vapor content and low hydrocarbon content can be provided for high-pressure gas-line transmission.

### References

1. Hammerschmidt, E. G., Ind. Eng. Chem., V. 26, 851-855 (1934).
2. Deaton and Frost, Monograph 8, U. S. Bureau of Mines (1946).

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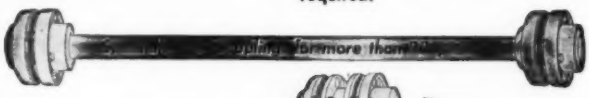

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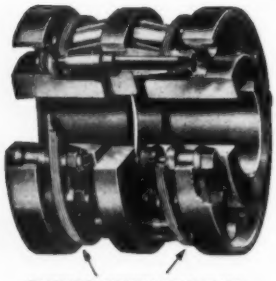

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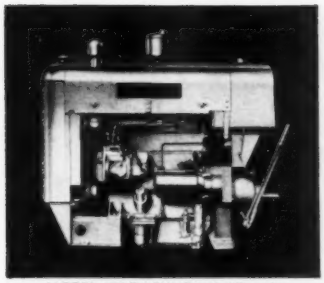
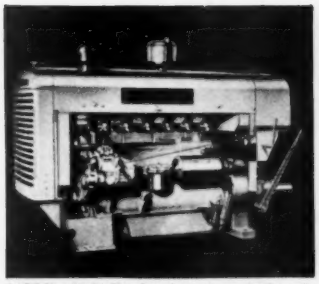
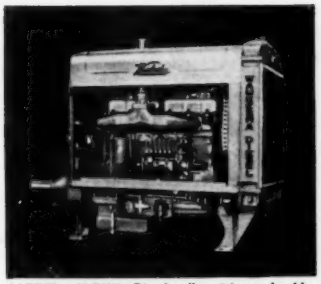


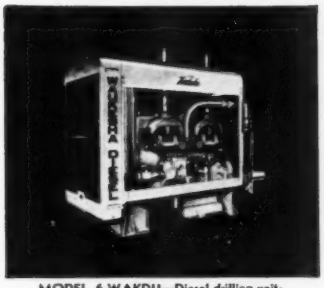
MODEL 180-DACU—Diesel utility unit; 12-27* hp.



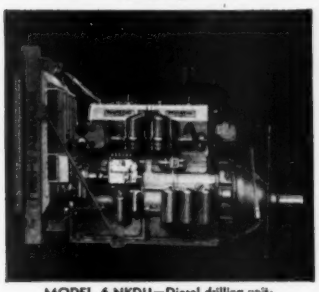
MODEL 190-DLCU—Diesel pumping and utility unit; 25-60* hp.



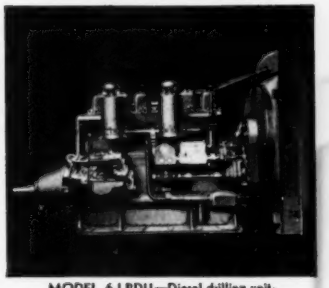
MODEL 148-DKU—Diesel well servicing and cable tool drilling unit; 86-150* hp.



MODEL 6-WAKDU—Diesel drilling unit; 121-190* hp.



MODEL 6-NKDU—Diesel drilling unit; 150-252* hp.



MODEL 6-LRDU—Diesel drilling unit; 240-333* hp.

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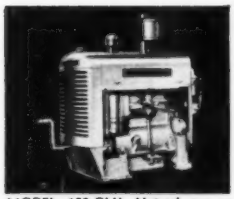
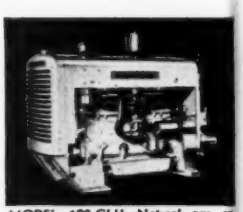


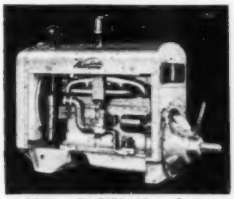
MODEL 180-GLU—Natural gas or gasoline utility unit; 20-32* hp.



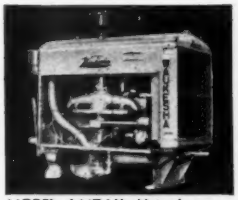
MODEL 190-GLU—Natural gas or gasoline pumping unit; 29-57* hp.

*Continuous Rating

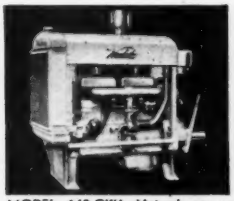
135



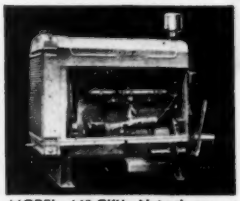
MODEL 195-GKU—Natural gas or gasoline pumping unit; 35-85* hp.



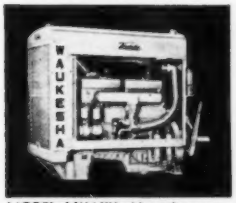
MODEL 6-MZAU—Natural gas or gasoline pumping unit; 40-72* hp.



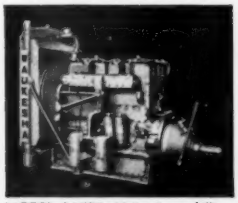
MODEL 140-GKU—Natural gas or gasoline servicing unit; 47-115* hp.



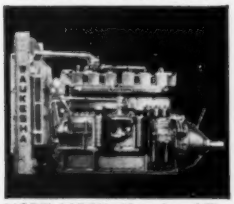
MODEL 145-GKU—Natural gas or gasoline servicing unit; 65-150* hp.



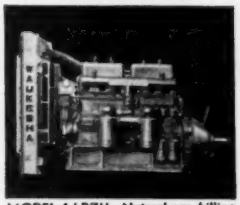

MODEL 6-WAKU—Natural gas servicing-drilling unit; 138-213* hp.



MODEL 6-NKU—Natural gas drilling unit; 156-216* hp.



MODEL 6-LROU—Natural gas drilling unit; 244-375* hp.



MODEL 6-LRZU—Natural gas drilling unit; 311-435* hp.

# Cost-imating

## Cost Indexes—Costs Are Rising

THE indexes of specific construction materials shown on this page, prepared by W. L. Nelson, Journal technical editor, may be used to bring the many costs published in the Cost-imating Series (October 21, 1948 weekly through December 29, 1949) to current prices. Similar itemized cost-indexes are published quarterly in the first weekly issues of January, April, July, and October. The Nelson Refinery Construction Index also appears in the first weekly issue each month.

(Multiply the prices of Cost-imating series by these indexes)

Base: 1946 = 100

| | 1947 | 1948 | 1949 | 1950 | Feb. 1951 | Reference | Complete index appears in Cost-imating |
|---|---|---|---|---|---|---|---|
| Labor: | | | | | | | |
| Skilled construction | 112.0 | 125.0 | 133.9 | 140.0 | 145.3 | Eng. News Record | No. 55—Nov. 3, 1949 |
| Common labor | 115.0 | 131.0 | 140.4 | 148.1 | 154.2 | Eng. News Record | No. 55—Nov. 3, 1949 |
| Refinery construction | 113.5 | 128.0 | 137.1 | 144.0 | 149.7 | [illegible] | No. 61—Dec. 15, 1949 |
| Refinery operation | 109.0 | 126.0 | 132.9 | 137.6 | †145.0 | Survey of Current Business | No. 55—Nov. 3, 1949 |
| Equipment or materials: | | | | | | | |
| Board insulation, 48-in. | 112.5 | 125.0 | 125.1 | 129.8 | | Code 561 | |
| Boiled tubes, 2-2¼-in. | 115.0 | †135.0 | 140.9 | 149.5 | 163.3 | Code 409.2 | |
| Brick and tile composite | 114.0 | 137.0 | 131.4 | 137.1 | 147.0 | Composite | No. 22—Mar. 17, 1949 |
| Brick, common | 110.5 | 127.0 | 133.1 | 138.2 | 147.1 | Code 498.1 | |
| Brick, fireclay | 114.0 | 126.0 | 131.3 | 144.9 | 155.5 | Code 499 | |
| Building materials composite | 135.5 | 153.0 | 145.8 | 155.4 | 172.0 | Composite | No. 22—Mar. 17, 1949 |
| Castings, gray iron | 118.5 | †139.5 | †141.5 | †160.0 | †173.4 | Code 416.8 | No. 46—Sept. 1, 1949 |
| Castings, pipe | 129.0 | †180.0 | 173.8 | 170.9 | 191.0 | Code 434.2 | No. 46—Sept. 1, 1949 |
| Cement | 110.0 | 125.0 | 128.2 | 131.2 | 141.3 | Code 509.1 | No. 22—Mar. 17, 1949 |
| Compressor | 114.0 | 128.0 | 120.0 | 118.8 | 138.1 | Manufacturer | No. 36—June 23, 1949 |
| Engines (composite) | 109.0 | 120.0 | 115.5 | 117.9 | 137.1 | Manufacturer | No. 36—June 23, 1949 |
| Gas | 111.0 | 122.0 | 117.0 | 121.8 | 134.6 | Manufacturer | No. 36—June 23, 1949 |
| Diesel | 108.0 | 117.0 | 114.0 | 114.0 | 139.7 | Manufacturer | No. 36—June 23, 1949 |
| Exchangers | †115.0 | †130.0 | †133.0 | | | | No. 3—Oct. 28, 1948 |
| Instruments (composite) | 113.0 | 120.0 | 123.1 | 127.8 | 142.4 | Manufacturer | No. 34—June 9, 1949 |
| Flow meter, mechanical | 102.0 | | 109.2 | 114.0 | 126.8 | Manufacturer | No. 34—June 9, 1949 |
| Flow meter, air control | | | 132.4 | 138.5 | 157.6 | Manufacturer | No. 34—June 9, 1949 |
| Flow meter, remote | | | 130.2 | 135.5 | 151.7 | Manufacturer | No. 34—June 9, 1949 |
| Potentiometer, 6-ft. | 111.0 | | 125.8 | 134.0 | 146.6 | Manufacturer | No. 34—June 9, 1949 |
| Potentiometer, air control | | | 131.6 | 134.1 | 136.8 | Manufacturer | No. 34—June 9, 1949 |
| Pressure controller | | | 130.2 | 135.6 | 153.3 | Manufacturer | No. 34—June 9, 1949 |
| Pressure gage | 109.0 | | 100.0 | 101.2 | 108.6 | Manufacturer | No. 34—June 9, 1949 |
| Thermometer recording | | | 118.6 | 124.0 | 144.3 | Manufacturer | No. 34—June 9, 1949 |
| Control valve | 117.0 | | 129.8 | 133.3 | 155.5 | Manufacturer | No. 34—June 9, 1949 |
| Insulation, asbestos pipe | 118.0 | 122.0 | 130.1 | 137.9 | 162.9 | Code 767 | |
| Lumber (composite) | 155.0 | 175.0 | 160.1 | 183.5 | 201.7 | Composite | No. 7—Dec. 2, 1948 |
| Cypress, C grade | 155.0 | 178.0 | 213.5 | †251.0 | 255.5 | Code 529-2 | |
| Pine, Ponderoso, No. 3 | 140.0 | 176.0 | 159.0 | 180.5 | 214.0 | Code 524-1 | |
| Pine, yellow timbers | 138.0 | 161.0 | 154.8 | †173.0 | 191.3 | Code 522-9.1 | No. 7—Dec. 2, 1948 |
| Redwood, heart | 134.0 | †159.0 | 154.6 | †181.0 | 191.5 | Code 528-3 | |
| Motors, electric | 110.0 | 112.7 | 114.0 | 130.8 | 148.8 | Manufacturer | No. 31—May 19, 1949 |
| Paint and paint materials | 137.0 | 135.0 | 127.5 | 119.8 | 138.4 | Composite | No. 22—Mar. 17, 1949 |
| Paint, inside, flat | 133.5 | 137.0 | 147.0 | 146.5 | 162.3 | Code 531.1 | |
| Paint, outside | 150.0 | †156.0 | 157.0 | 147.0 | 159.6 | Code 532.1 | |
| Pipe, sewer | 111.5 | 121.5 | 119.1 | 132.0 | 152.4 | Code 572.1 | No. 22—Mar. 17, 1949 |
| Pipe, black, ¾-in. | 120.5 | †148.0 | 152.2 | 159.7 | 169.6 | Code 435.1 | No. 42—Aug. 4, 1949 |
| Pumps (composite) | 118.7 | 129.1 | 131.7 | 136.0 | 159.7 | Manufacturer | No. 29—May 5, 1949 |
| Centrifugal | 109.0 | 120.0 | 118.0 | 128.1 | 136.2 | Manufacturer | |
| Reciprocating | 128.5 | 138.1 | 144.6 | 143.9 | 183.3 | Manufacturer | |
| Sand | 112.0 | 122.0 | 127.4 | 129.3 | 137.6 | Code 579.2 | |
| Steel (composite iron and steel) | 121.0 | 140.5 | 150.2 | 155.2 | 168.2 | Composite | No. 61—Dec. 15, 1949 |
| Plate (tank) | 117.5 | †144.0 | 144.5 | 151.7 | 161.0 | Code 446.3 | No. 5—Nov. 18, 1948 |
| Sheet, galvanized | 105.0 | †146.0 | 139.0 | 150.0 | 165.6 | Code 448.3 | |
| Structural | 113.5 | †145.0 | 151.3 | 162.7 | 172.5 | Code 452.2 | No. 18—Feb. 17, 1949 |
| Transformers | 116.0 | 116.0 | 116.0 | 116.0 | 130.5 | Manufacturer | No. 31—May 19, 1949 |
| Marshall-Stevens equipment (only) indexes: | | | | | | | |
| Process industries (average) | 121.0 | 131.5 | 131.5 | 135.8 | 145.9 | Chem. Eng., April 1951 | Chem. Eng., Feb. 1951 |
| Chemical | 119.5 | 130.0 | 130.0 | 133.8 | 143.4 | Chem. Eng., April 1951 | Chem. Eng., Feb. 1951 |
| Petroleum | 121.0 | 132.0 | 132.0 | 136.5 | 146.7 | Chem. Eng., April 1951 | Chem. Eng., Feb. 1951 |
| Electrical power | 122.0 | 135.0 | 135.0 | 139.3 | 149.4 | Chem. Eng., April 1951 | Chem. Eng., Feb. 1951 |
| Refrigeration | 129.0 | 141.0 | 139.9 | 147.3 | 159.9 | Chem. Eng., April 1951 | Chem. Eng., Feb. 1951 |
| Steam power | 122.0 | 132.0 | 132.0 | 136.6 | 147.6 | Chem. Eng., April 1951 | Chem. Eng., Feb. 1951 |
| Nelson—Refinery Construction | 117.0 | 132.5 | 139.6 | 146.2 | 155.6 | | No. 61—Dec. 15, 1949 |

*The reference for all codes, or for composite, is "Wholesale Prices" published monthly by the Bureau of Labor Statistics, U. S. Department of Commerce. †Estimate.

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# PROGRESS in METALS

**by W. L. Nelson**
Consulting Engineer

## Conservation of Critical Metals by Powder Industry

THE role that powder metallurgy can play in present and future mass-production plans is described by A. J. Langhammer in the February issue of Materials & Methods. He relates the experiences of his company, Amplex Manufacturing Co. of Detroit. Finished machine parts, bearings, and other units can be replaced by metal powder products, not only when strategic materials are involved but also cast iron or steel is employed. Iron powders can be used because they are made mainly from waste products or other raw materials available in sufficient quantity that are not controlled.

Briefly, metal powder parts are made by pressing (or briquetting) the metal powder to size and dimension, then heat treating (sintering) without the briquette losing its form or shape. Briquetting is accomplished on automatic machines and in one operation. After sintering, the parts may or may not be given a sizing operation, and this, too, is performed in one stroke of a press. In a vast majority of cases, no machining is required; therefore, there is little scrap.

Aside from making finished machine parts available for replacement of units now being produced from other materials, powder metallurgy offers several other advantages. For example, no machine tools, tooling program, jigs, fixtures, dies, or gages are required. Generally, there is also an effective saving in manpower and speed of delivery. Tooling for powder metallurgy is more quickly accomplished than by normal production methods. This advantage is particularly important when producing complicated or detailed parts.

### Finished Machine Parts

The wide extent of design and application is illustrated by the production of Amplex. "We fabricate such units as pistons, guides, sleeves, housings, cams, gears, sprocket wheels, ratchets, plates, gibs, and bases, which are used in such industries as machine tools, special machinery, factory equipment, automotive, farm implements, textile, toys, conveyors, household appliances, engines, ships, etc.

"Equally broad is the range of size in which these finished machine parts are made. In mass production quantities they vary from several hundred units to the pound to parts that weigh 2 to 3 lb. each. Where smaller quantities are required, units are frequently much larger in size. They may range in weight from 10 lb. to more than 200 lb. each."

Costs are sometimes greatly reduced. When made by normal machining methods, the cost of a small bar was 70 cents and the slide to go with it was $1.30. Made from metal powder, these parts now cost only 5 cents and 6 cents, respectively. Such reductions in cost of manufacture are typical of the experience of Amplex.

### Other Advantages

"On any unit where motion occurs, powder metallurgy provides the indispensable and otherwise unobtainable feature of self-lubrication. Moreover, many of these products are precision units manufactured to close tolerances.

"Where weight is a factor, there is saving in weight with metal powder parts. Normally, powder metal units have a porosity of approximately 25 per cent by volume. Therefore, an appreciable advantage in terms of weight can be achieved without changing from a basic material.

"Since the normal porosity value is the order of 25 per cent, any unit made from metal powders of the same material as used in the solid must be at least 25 per cent less strong. However, for any given metal or alloy if high strength is required this, too, may be effected by special processing. In laboratory practice we have equaled the properties of the solid or cast materials.

"Tooling for powder metallurgy is not nearly as expensive when compared to that of normal manufacturing methods. Invariably, the latter employ jigs, fixtures, cutting tools, and, sometimes finishing operations which are definitely more costly. Also, the time interval required in the case is much longer since patterns, castings, and forgings are usually involved.

"Some of our tools cost as low as $150 per set, and approximately $400 would be the average cost. On the other hand, we have made special tools that cost several thousand dollars but, even in these instances, the amount was considerably less than that which would have been required for normal machining.

"In our experience we have found that the quantity required (for profitable production) is frequently much lower than originally anticipated. In general production, a good average figure would lie in the range of 2,000 to 10,000 pieces, although quantities exceeding 100,000 are not at all common. However, small quantities can be produced on special requirements, by hand or so-called laboratory methods. While the manufacturer of finished machine parts from metal powders is particularly suited to mass production, its advantages apply equally well in many instances where the quantities needed are appreciably lower.

"Obviously, too, there are many applications for which there is no satisfactory substitute for the powder metal product. This applies where self-lubrication is necessary. It is also true where specific weight is a consideration; where definite friction properties are required; and when other factors are present, such as those which pertain to permanent filtering."

## Free-Machining Stainless Steels Inferior in Corrosion Resistance

ALTHOUGH free-machining steels and alloys have permitted fabricators to operate on a mass-scale basis in the production of many intricate small parts and although such parts exhibit a good surface finish, such steels tend to be brittle and to be unsatisfactory or dangerous for some of the exacting services of the petroleum industry.

The free-machining steels most frequently encountered in the petroleum industry are B-1100 series (Bessemer resulfurized), C-1100 series (open-hearth resulfurized), Type 303 stainless (resulfurized 18-8, sometimes selenium is used), and Type 416 stainless (resulfurized 12 chromium).

One of the best papers on this subject, and particularly regarding free-machining stainless steels, is that of Holmberg and Prange. It was presented before the A.S.M.E. in October 1946 at Tulsa.

Difficulty has arisen primarily because the ordinary physical test properties of the free-machining steels do not indicate the brittle nature of these materials. Such steels should not be used where toughness or energy absorption is required, "that is to say, where the finished piece may be subjected to overloading or plastic deformation so as to accommodate itself in the structure." Some of the free-machining steels are no better than cast iron for such services. Examples of such unsuitable uses are bolts, pipe fittings, bull plugs, swages, valves, many machine parts, etc.

Particular attention is directed toward free-machining stainless steels. These steels are used primarily for corrosion resistance, and yet the addition of sulfur to gain free machining destroys, to a large extent, the resistance to corrosion. Sometimes corrosion occurs 50 times more rapidly.

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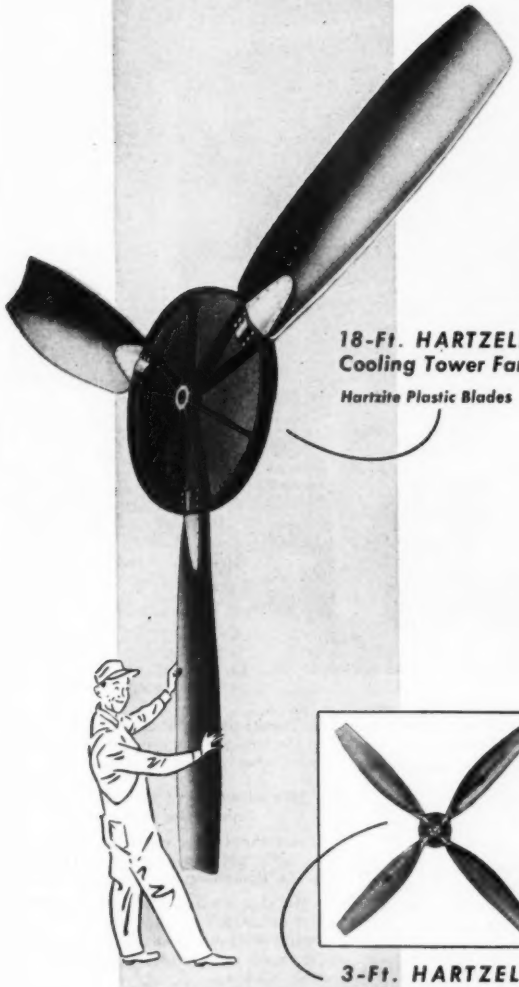

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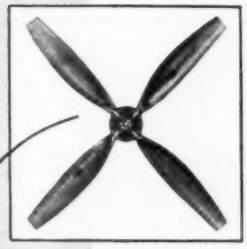

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# Applications of Bottom-Hole-Pressure Surveys to Reservoir Engineering

MEASUREMENT of reservoir pressure is one of the most important responsibilities of the reservoir engineer. This responsibility is not necessarily limited to observation techniques employed in taking of individual well pressures. Especial attention must be given to selection of key wells and choice of survey shut-in time, weighting of pressure data, establishment of field datum, and determination of frequency of surveys, to the end that there will be valid applications of field-wide pressure data to operating problems.

### Applications

Field-wide bottom-hole-pressure surveys find wide application in calculation of reserves by material-balance method, in selection of most efficient oil-producing rates from producing efficiency data (barrels of fluid per day per pound) for study of direction and intensity of water encroachment, for use in allocation formulas, for prediction of gas-oil-ratio behavior for segments of an oil reservoir, and the like.

Selection of key wells for a field-wide pressure survey is related primarily to permeability distribution. Other factors influencing key well selection include uniformity of well pattern, adequacy of pay penetration, structural position, and presence of an effective water drive. Fewer key wells would be required in a highly permeable controlled-rate reservoir having an effective water drive, than would be the case for a low-permeability internal gas-drive reservoir with irregular well-spacing development, irregular pay penetrations, and with an irregular withdrawal-rate history.

### Survey Shut-in Time

Value of a pressure survey in a low-permeability reservoir is related to choice of proper shut-in time.

As in the case of key well selection, choice of survey shut-in time is related to permeability distribution. For example, in the case of a Dundee (Devonian) dolomite of Central Michigan exhibiting secondary dolomitization with resultant high permeabilities, buildup curve characteristics revealed that reservoir pressure on a given test well rose rapidly from 960 psig. (pressure at flow rate of 310 bbl. of oil per day) to a value of 1,369 psig. in only 2½ hours, and to an asymptote of 1,372 psig. in only 4 hours. Likewise, in the eroded solution channels of the TXL-Devonian reservoir of Ector County, West Texas, new completions exhibited initial static bottom-hole pressure at or near the weighted average field pressure; this illustrates close correlation between permeability distribution and pressure distribution. Thus, where pressure equalizations are rapid as in the two above cases, relatively short shut-in times are required.

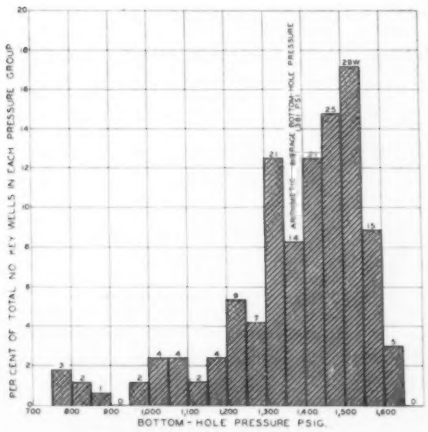



*Fig. 1. Frequency distribution of key wells in pressure survey.*

On the other hand, where pressure equalizations are slow, as in heterogeneous limestone reservoirs, longer shut-in times are required. Consider secondary dolomite limestones of the low permeability Manning (Mississippian) reservoir in Major County, Oklahoma. Here permeabilities are in the order of 5 md. and as much as 120 hours of shut-in time is reduced to obtain valid static pressure values; as much as a week might be required to reach true pressure equilibrium in this field.

In some major fields, it would be uneconomic to shut in an entire field at one time. In lieu of that practice, value of shutting in certain segments of a field to permit field pressure tests will help to improve approach to static reservoir conditions rather than allow offset wells to produce while pressure bomb is run into a test well.

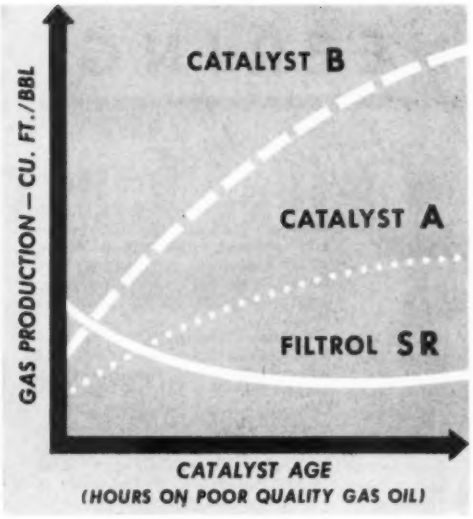
### Weighting Pressures

Areally weighted pressure surveys are standard practice in engineering committee work. Danger of using arithmetic average pressure is illustrated in Fig. 1; this graph shows erratic distribution of a group of 169 key wells employed in a field-wide pressure survey taken on September 1, 1944, in a West Texas Permian reservoir, i.e., the per cent of total number of key wells in each pressure group. In addition, the number of wells which fell in each pressure group are marked above each bar.

### Correlation of Surveys

Plotting, contouring, and planimetering of bottom-hole-pressure survey maps comprise an integral part of reservoir-engineering routine. Corresponding pressure bands in all successive pressure survey maps may be colored in distinctive colors to facilitate observation of field-pressure anomalies with time. Unusual reservoir-behavior features can be singled out for study by contouring special areal pressure maps showing pressure differential between successive field surveys by individual wells.

By Joseph A. Kornfeld, Mid-Continent District Editor, Tulsa

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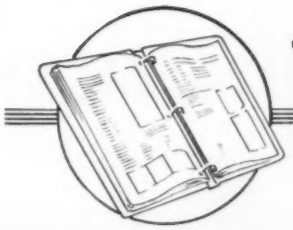

# THE REFINER'S notebook

No. 78

# Factors Affecting Throughput in Fluid Catalytic Cracking

by P. M. Reynolds*

## PART 2—HEAT BALANCE

THE gas-oil feed to the reactor must be vaporized, heated to reaction temperature and the heat of reaction must be supplied. In fluid operation this may be accomplished by exchange with products from the fractionator, then heating in a furnace and finally by mixing with the hot regenerated catalyst from the regenerator. The catalyst circulation is automatically controlled by large "slide valves" which open and close to regulate the final reaction bed temperature.

In the regenerator, all the coke formed on the catalyst in the reactor must be burned off so that the heat of combustion must be removed from the regenerator. The major portion of the heat of combustion is removed from the regenerator by catalyst going back to the reactor and the remaining heat must go out with the flue gases or be removed by circulating catalyst through coolers or waste-heat boilers.

**Heat-balanced unit.** — The heat balance of the regenerator is a function of the amount of coke burned. Some units are designed so as not to require recycle catalyst coolers. In this "heat balanced" type of unit the heater operation on the gas-oil feed must be varied inversely with the coke production to keep the reactor and regenerator in temperature balance. If the regenerator and reactor are held at a constant temperature, and coke production goes up suddenly, then the oil heater must be slowed down and catalyst circulation stepped up to remove more heat from the regenerator. Otherwise the regenerator temperature will go up and out of control. The heating rate must, of course, be stepped up when coke production in the reactor goes down.

The following typical heat balance of a fluid unit shows the relationship between coke laydown, preheat and catalyst circulation. Case 1 for a coke laydown of 6.0 per cent fresh feed will be presented first.

*Process engineer, Mid-Continent Petroleum Corp. Paper presented at second annual John Zink process heating seminar, Tulsa.

### MATERIAL BALANCE
**(Applies to Case 1 and Case 2)**

Fresh feed, 30° A.P.I. gas oil:
= 20,000 B.P.D.
= 255,000 lb./hour
Total recycle, 27° A.P.I.:
= 25 volume per cent fresh feed
= 5,000 B.P.D.
= 65,050 lb./hour
Conversion:
= 55 volume per cent disappearance of fresh feed
Total gas oil product, 29° A.P.I.:
= 45 volume per cent fresh feed
= 9,000 lb./hour
= 115,600 lb./hour
Dispersion steam to reactor (140 psia., 100° F. S.H.):
= 10,000 lb./hour
Regenerator flue gas analysis:

| Dry basis | Mol. per cent |
|---|---|
| $CO_2$ | 12.0 |
| CO | 6.0 |
| $O_2$ | 1.0 |
| $N_2$ | 81.0 |
| Total | 100.0 |

Heat of cracking reaction (gasoline plus gas at 900° F.):
= 95 B.t.u. per lb.
Heat of combustion of coke (gross H.V. at 32° F.):
= 14,500 B.t.u. per lb.
Average specific heat of catalyst from 900°-1,075° F.:
= 0.270 B.t.u. per lb.
Reactor at 900° F., 15 psig.
Regenerator at 1,075° F., 9 psig.

### CASE 1

Coke laydown:
= 6.0 weight per cent of fresh feed
= 15,300 lb./hour
Hydrogen in coke:
= 9.0 weight per cent of coke
= 1,377 lb./hour
Carbon in coke:
= 91.0 weight per cent of coke
= 13,923 lb./hour
Gasoline plus gas products:
= 255,000 — 115,600 — 15,300
= 124,100 lb./hour
Air to regenerator:
= 190,010 lb./hour
Water of combustion of coke:
= 1,377 × 9 = 12,400 lb./hour
Total flue gas from regenerator:
= 190,010 + 15,300
= 205,310 lb./hour

### A. Heat Balance of Regenerator
**(Basis 32° F.)**

| 1. Heat into regenerator— | B.t.u./hour |
|---|---|
| Combustion air in at 300° F. = 190,000 (300 — 32) (0.241) | = 12,270,000 |
| Sensible heat of coke at 900° F. = 15,300 (900 — 32) (0.60) | = 7,971,000 |
| Heat of combustion of coke = 15,300 × 14,500 | = 221,850,000 |
| Total heat into regenerator excluding cat. circulation | = 242,091,000 |

| 2. Heat out of regenerator— | B.t.u./hour |
|---|---|
| Sensible heat in flue gases = 205,310 (1,075 — 32) (0.269) | = 57,603,000 |
| Latent heat of water in flue gases = 12,400 × 1,075 | = 13,333,000 |
| Heat loss out of regenerator insulation | = 1,000,000 |
| Total heat out of regenerator excluding cat. circulation | = 71,936,000 |

3. Heat available to circulating catalyst = (242,091,000 — 71,936,000) = 170,155,000

### B. Heat Balance of Reactor

| 1. Heat required in reactor: | B.t.u./hour |
|---|---|
| Heat and vaporize feed in at 100° F. = 255,000 [135 + (900 — 100) (0.710)] | = 153,765,000 |
| Heat and vaporize recycle in at 400° F. = 65,050 × [119 + (900 — 400) (0.656)] | = 29,077,000 |
| Heat of reaction = 124,100 × 95 | = 11,790,000 |
| Heat dispersion steam = 10,000 (1,611 — 1,250) | = 3,610,000 |
| Heat loss through reactor insulation | = 600,000 |
| Total reactor duty required | = 198,842,000 |

| 2. Heat from circulating catalyst | B.t.u./hour |
|---|---|
| Heat put in feed by furnace = (198,842,000 — 170,155,000) | = 28,687,000 |

3. Feed heater outlet temperature:

$$\text{Temp. diff.} = \frac{28{,}687{,}000}{255{,}000 \times 0.535} = 210^\circ \text{ F.}$$

Furnace outlet temperature
= 100 + 210 = 310° F.

### C. Catalyst Circulation

$$\frac{170{,}155{,}000}{(1{,}075 - 900)\ (0.270)} = 3{,}601{,}000 \text{ lb./hour} = 30.0 \text{ tons/min.}$$

### D. Catalyst/Oil Ratio

$$\frac{3{,}601{,}000}{255{,}000} = 14.1 \text{ to } 1 \text{ on fresh feed}$$

$$\frac{3{,}601{,}000}{(255{,}000 + 65{,}050)} = 11.3 \text{ to } 1 \text{ on throughput.}$$

Case 2, heat balance for 5.5 per cent fresh feed coke laydown, will be presented in the next installment of the Refiner's Notebook.

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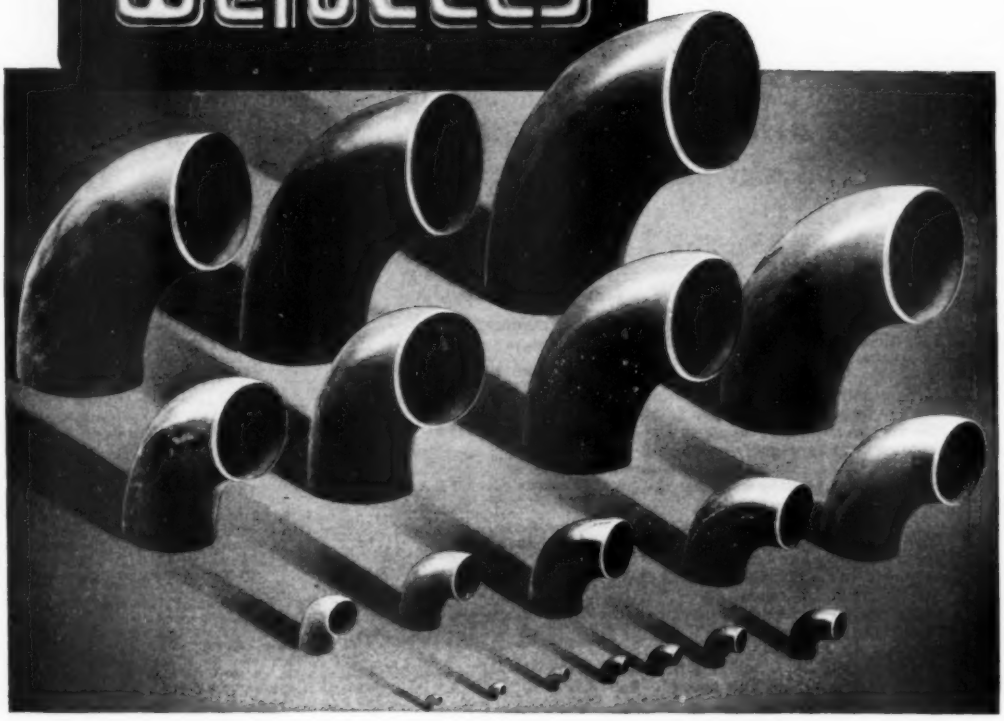

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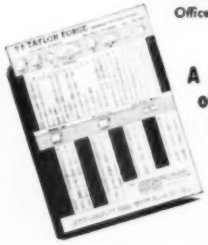

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**7 SYNTHETIC RUBBER BASED CORROSION CONTROL COATINGS** is an informative bulletin available to management, corrosion, and maintenance engineers interested in problems of corrosion control. Characteristics, properties, uses, and methods of application as well as machinery enamels, damp-wall enamels, floor coatings, and other products are discussed. *Case & Case Coating Co.*

**8 CORROSION AND HEAT RESISTING STEEL ANALYSES CHART,** bulletin 333, is a valuable reference tabulation of stainless-steel analyses as produced by various manufacturers. *Globe Steel Tubes Co.*

**9 MECHANICALLY-SEALED TLB PUMPS,** which handle hydrocarbons without leakage, fire hazard, repacking problems, and operated with a minimum of attention, are described in TLB Bulletin 50-9200. It also includes pump-selection table and fric-

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tion-compression charts. *Byron Jackson Co.*

**10 SCIP, THE LIQUID GO-DEVIL,** is a booklet describing how this product prevents corrosion on new lines, clears scale from old lines, and maintains full-capacity flow. *Shell Development Co.*

**11 BASIC APPLICATION PROCEDURES FOR HYRECO PROCESSING UNITS** is a 52-page discussion on the theory, application, and operation of the Hyreco Processing unit and the principle of cold separation. It is published in question-and-answer form for ease of reading. Flow diagrams, charts, and illustrations will give men experienced in handling and processing high-pressure gas a quick insight into its operation. *The Parkersburg Rig & Reel Co.*

**12 87' AND 96' CANTILEVER MASTS,** is a six-page multicolored brochure, showing photographs of both masts, crown blocks, skid and subbase, as well as descriptions and drawings. *Lee C. Moore Corp.*

**13 IMPROVED POLYAMID ANTI-FOAMS** is a technical bulletin discussing aerosol problems and prevention of resulting deposits. Product also prevents foaming to produce purer steam, thus eliminating scale formations. *Dearborn Chemical Co.*

**14 STEAM TRAP BOOK** is a 36-page facts folder on trap design and sizes. Also discusses applications and correct installation procedure. *Armstrong Machine Works.*

**15 SERVICE DITCHER.** Bulletin 705A is an 8-page description of the Runabout Hydra-Crowd service ditcher with 15 m.p.h. road speed, and powered by a 42-hp. engine which turns at 140 r.p.m. for digging and at 2,000 r.p.m. for travel. It also includes numerous photographs and engineering data. *Barber-Greene Co.*

**16 CHEMICAL FOR BRUSH AND WEED CONTROL** is a 12-page manual covering data on methods and results in chemical brush and weed control, and including records of brush-control experience of power companies, railroads, gas-pipe-line companies, and oil companies. It is profusely illustrated showing "before-and-after" pictures of brush spraying operations. *E. I. du Pont de Nemours & Co., Inc.*

**17 VALVES.** Catalog 1500B describes in detail the operation and performance of single-seated valves designed to control hot or cold fluids of all types. Many optional assemblies for specialized applications are also shown. *Annis Co.*

**18 CRAWLERS, BOOM-TRACTORS AND BULLGRADERS** used in handling every phase of the pipe-laying business is presented in picture-caption style in a new 12-page booklet. It also contains a selectograph showing lifting capacities. *International Harvester Co.*

**19 INDUSTRIAL, CHEMICAL AND REFINERY METERS.** Bulletin OG 400 is a guide in the proper selection of meters for measuring chemicals, petroleum products, and other liquids with varying corrosive characteristics. In addition it includes a complete table of metered liquids, chamber and piston specification, and a simplified specification sheet covering necessary requirements. *Rockwell Manufacturing Co.*

**20 LUMMUS AT PAN-AM SOUTHERN.** The new coking unit at Pan-Am Southern Corp.'s El Dorado, Ark, refinery is featured in New Horizons, a 20-page, illustrated brochure. The delayed-coking process is reviewed and a full-page flow chart graphically illustrates the plant. *Lummus Co.*

**21 GMV SUPERCHARGED COMPRESSOR UNITS** is a 39-page multicolored bulletin featuring 4, 6, 8, and 10-cylinder 440 to 1,350-b.hp. compressor units. Dimensional charts, specifications, and illustrations are included, as well as photographs on various compressor-station installations. *Cooper-Bessemer Corp.*

**22 LABELON TAPE** is a neoprene-base adhesive which is waterproof, oil-proof, smudge-proof and acid-resistant. It is applicable to wood, glass, plastics, metal, ceramics or almost any clean surface, is transferable, and is available in four colors. *Labelon Tape Co.*

**23 ENGLISH ELECTRIC** is a five-page pamphlet describing and illustrating a 220-b.hp. "package-type" drilling-rig unit, including specifications data and dimensional chart. *English Electric Co., Ltd.*

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**THE OIL AND GAS JOURNAL**
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# OIL AND GAS EQUIPMENT Digest

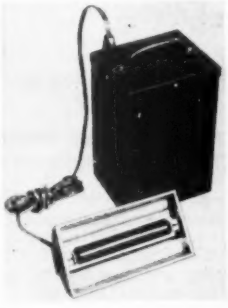
IT'S NEW CHECK IT

**by Dan B. Miller**

**24 WELL-HEAD STUFFING BOX** was developed to provide the industry with a well-head stuffing box specifically designed to compensate for polished-rod alignment. As shown in a cross-sectional view, the upper portion of the box contains the packing floats horizontally on the smooth face of the lower body. A hycar "O" ring provides the seal between the two sliding faces. Ring-type packing in the upper portion of the box seals the polished rod against leakage. All portions of the stuffing box that contact the polished rod are made entirely of high-tensile-strength bronze to avoid any possibility of scoring or of excessive wear of the polished rod. The self-aligning boxes are available for polished rods up to and including 1¾-in. diameter and have 3-in. external pipe threads for connecting to the well head. *Pelton Water Wheel Co.*

IT'S NEW CHECK IT

**25 NEW BLACKLIGHT LEAK DETECTOR** for the detection of leaks of liquids in vessels of all kinds and sizes depends on the phenomenon of fluorescence. This lamp is simple in operation and is particularly adaptable since it may be battery operated. All hazards of shock from power circuits under wet conditions are eliminated and the equipment is completely portable. An extremely dilute solution of an effective fluorescing agent is placed inside the container or vessel to be tested. The slightest flow through the wall is unmistakably signalled by a bright glow under the influence of the rays from the exploring lamp. *George W. Gates & Co., Inc.*



IT'S NEW CHECK IT

**26 MARTIN CAGES** are equipped with synthetic-rubber ball guides (perforated to prevent blisters) which are held in place by both mechanical means and oil-proof cement. The well-known properties of rubber, such as resilience (against beating of the ball), resistance to sand abrasion, nonmagnetic character, and electrical resistance, are thus employed to combat cage problems. The life of the cage as well as balls and seats is greatly extended. *John N. Martin, Manufacturer.*

IT'S NEW CHECK IT

**27 SAMPLING OR VENTING VALVE.** A new double-duty valve can be used for sampling oils and other liquids or for venting air into tanks. When used for sampling, valve is inserted close to the bottom of the tank permitting samples to be drawn off conveniently. Inserted at the top of a tank, the same valve can be used for venting air. The brass valve has a steel ball inside its body which is pressed against the seat of an orifice by a conveniently located and easily operated threaded-

**The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.**

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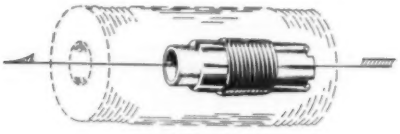
hex bolt. A hex nut on the bolt locks the assembly securely in place. The hex bolt has a hole through the center to permit the passage of liquid to be sampled or air for venting. It also has a cross slot at its end nearest the ball. When the threaded bolt is backed up, the steel ball is lifted from its seat, permitting liquid to flow past the ball, through the cross slot, and on through the center hole of the bolt where it is collected for sampling. *Oil-Rite Corp.*

IT'S NEW CHECK IT

**28 GRANT REAMER** is a rugged tool that incorporates a minimum of parts and designed for easy operation in stabilization and reaming out the hole to full gage. Made from tough alloy-steel forgings and heat treated for added strength, the reamer is streamlined to permit uninterrupted flow of circulation fluid, and the cutters are so angled that weight must be applied to make the tool progress downwards. It cannot, therefore, corkscrew itself into the hole. The reamer can be run with either end up, thus giving added service and reducing the need for subs. A unique locking assembly insures against loss of the cutters in the hole and worn cutters are easily and quickly replaced at the rig. *Grant Oil Tool Co.*

IT'S NEW CHECK IT

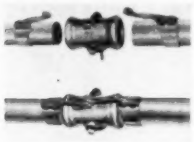
**29 PERMAFLO CHOKE** eliminates choke failures. These oil-well chokes are lined with fused Zirconium Oxide, an extremely hard element that resists sand abra-



sion and corrosion. Sand, salts, and acids have little or no effect on this hard interior surface. It is available in 22 standard sizes from 3/64 to ½ in. Longer lengths are available. *Perma Sales Co.*

IT'S NEW CHECK IT

**30 NEW QUICK COUPLER** for industrial pipe lines speeds and simplifies the setting up, moving, and maintaining of portable construction and industrial pipe lines. One man can lay as much as 1,000 ft. of pipe per hour as a result of instant hookup without tools. Easy-access outlets for connecting air lines or lateral hoses are provided on each coupler. Works efficiently for oil or gas lines, chemicals or fuel oils, or on air and water at high pressures. Safe, positive, blow-out-proof sealing is assured by a unique gasket in either rubber or Neoprene. Couplers are tested to handle 300 psi. Coupler built for plain end pipe; rolled, welded, or formed ends not needed. While the special gasket can be removed by a flick of the finger, it can't come out when in use, and is protected by the coupler lip against tearing or damage by careless handling of pipe. *R. M. Wade & Co.*

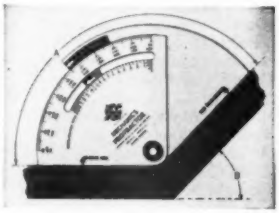


IT'S NEW CHECK IT

**31 PEAK-PRESSURE INDICATOR** was evolved to provide a reliable instrument for medium and high-speed engines. Indicator shows whether there is any unequal loading of cylinders due to piston-ring wear, valve leakage, and in case of diesels, through unequal metering of fuel, choke atomizers, or other causes. Cylinder peak-pressure indicator can be used on all speed ranges. Standard model is calibrated for pressures up to 1,500 psi. Fuel line peak-pressure indicator is particularly useful on diesels utilizing high-viscosity fuel oil by detecting choking atomizers which may produce undesirable fuel-line pressures. Instrument is suitable for pressures up to 15,000 psi. and is graduated at 100 psi. intervals. Picture is of the fuel-line peak-pressure indicator. *Dobbie McInnes, Ltd.*

IT'S NEW CHECK IT

**32 MECHANIC'S PROTRACTOR** offers a practical solution to on-the-job angle-measuring problems up to 180°. Gives readings for outside angles, such as angles of bend, or deflection for inside (inclusive) angles, and inches-per-foot against degrees. Difficult angles can be measured with this protractor in conjunction with a bevel. Calibrations are at the extreme of the radius, enabling accurate, clear readings to a fraction of a degree. It is a helpful tool for construction men, engineers, foremen, inspectors, mechanics, sheet-metal workers, pipe-layout men, and welders, and is a handy pocket size and light in weight. *Interstate Sales Co.*



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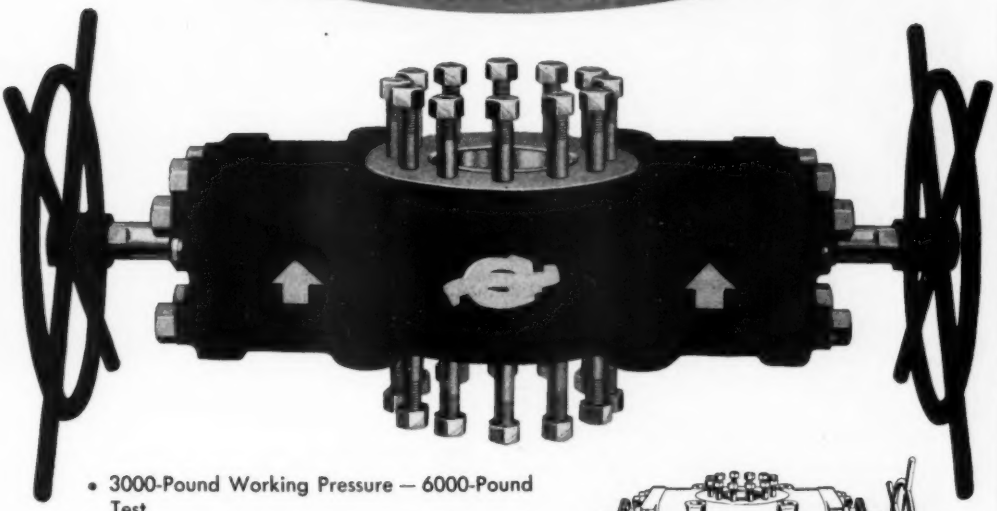
## *Only 9½ inches High**



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- Quick Change Rams — Manually Operated
- Also Furnished for Single End Operation
- Husky, Non-Rising Stem
- Ideal for Work-Overs and Small Hole Drilling
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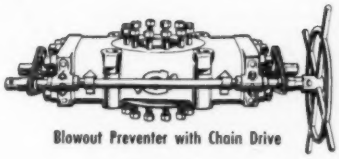

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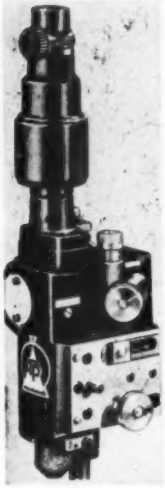
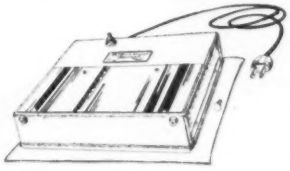


**33 PORTABLE VALVE-SEAT GRINDER** reduces engine-maintenance costs in the field. It is of simple design and any mechanic can do a precision valve-seat-grinding job. The unit will grind seats in any material from hard-faced steels to cast iron. Complete unit weighs 22 lb. and may be used wherever air pressure is available. Horizontal slide plates with tongue-and-groove design permit easy adjustment of grinder head either outwardly or inwardly through full grinding range. Dresser is attached directly to grinding unit, thus permitting use of dressing wheels without removing grinder from pilot. Air motor provides greatest horsepower per pound of weight and greatest safety in hazardous areas. Perfect alignment between valve and seat is assured. A knurled hand wheel for rapid adjustment and a calibrated hand wheel for fine adjustment provide micrometer accuracy for feeding grinder outward. Three models cover range of engine valve seats having inside diameters from 2-15/16 to 12 in. *Thompson Products, Inc.*

IT'S NEW CHECK IT

**34 CONTOURA,** a new inexpensive portable photocopying device, weighs only 4 lb., and fits easily in a briefcase. It will copy pages of tightly bound books as well as sheet material. It is particularly useful in the oil and gas industries for making copies of material in the field, and for searching titles for rights-of-way. *F. G. Ludwig Associates.*



IT'S NEW CHECK IT

**35 FAST CLEANING OF RIGS AND ENGINES.** An inexpensive setup for cleaning exteriors of oil-field pumping engines and rig floors, includes two 40-gal. tanks mounted on the bed of a pickup truck, equipped with filling cocks at the top and drain cocks on the bottom. A small gasoline-driven centrifugal pump is connected so that it pumps from either tank. It delivers about 40 psi. to 25 ft. of rubber hose, fitted with an adjustable nozzle. Magnusol, mixed one part to eight parts kerosine is charged in one of these tanks, and the other is filled with water. The engine and floor are sprayed with the solution and allowed to soak in for about a half hour. Pump is then switched over to the water tank and the engine and floors rinsed clean. *Magnus Chemical Co.*

IT'S NEW CHECK IT

**36 A 4-LB. DRY-CHEMICAL FIRE EXTINGUISHER** with a rubber hose features maximum extinguishing effectiveness for inexperienced operators. Discharge time has been increased on this model, giving untrained personnel more time to extinguish the fire. Operating range is 12 to 15 ft. It has received a B2, C2 rating from Underwriters' Laboratories. Dry chemical is ejected through a self-closing nozzle which produces a fan-shaped stream pattern. The extinguisher is pressurized by a 1½-oz. carbon dioxide cylinder in the dry-chemical chamber. Addition of the self-closing nozzle makes the new unit weather-tight. When fully charged, the unit weighs 10½ lb. Hose assembly is 15¼ in. *Ansul Chemical Co.*

IT'S NEW CHECK IT

**37 HEAVY-DUTY VALVE NO. 788** is equipped with totally enclosed gear-reduction drive, extended shaft, and floor stand. The sealing of water pressure is obtained by utilizing a babbitted seat in the body and Monel, or stainless steel, welded to the periphery of the valve disc. Such metal-to-metal seat gives satisfactory commercial shut-off in most installations. For instance, with a 350-ft. head of ambient water, a 36-in. valve with a babbitted seat has a leakage of only 50 g.p.h. Remote, automatic, or semiautomatic controls are also available for this type of valve. *R-S Products Corp.*

IT'S NEW CHECK IT

**38 AER-O-FOAM "99"** is a liquid type mechanical foam for use on fires involving polar solvents or petroleum products. In actual fire-fighting demonstrations it was easily generated in a mechanical system, flowing freely to provide a smothering, close-knit blanket of fire-killing foam. Extensive tests have shown that on fires involving polar solvents, including methyl, ethyl, and isopropyl alcohols, esters, ketones, and ethers, as well as petroleum products, the new liquid-type mechanical foam will not readily break down or disintegrate. Aer-O-Foam "99" moves out quickly onto a blazing surface in a mass of tight-knit, air-filled bubbles. This thick, chemically resistant blanket of foam spreads across the flaming fluid, smothering the flames completely and positively. There is no chance of reignition. If the foam mass is broken, it quickly reseals. It also adhers to and insulates all types of surfaces. *National Foam System, Inc.*

IT'S NEW CHECK IT

**39 FUSED STABILIZED ZIRCONIA** in molded shapes will withstand temperatures up to 4,600° F., far beyond the limit of most other commercial refractories. It is a poor conductor of electricity at low temperatures but an excellent electrical conductor when subjected to high heat. In spite of its high-bulk density, it is a low conductor of heat and, therefore, a superior thermal-insulating material. *Norton Co.*

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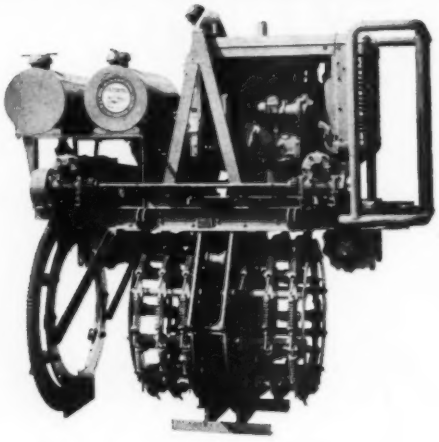

**MODEL "K" PIPE CLEANING AND PRIMING MACHINE** can be set up to clean and prime pipe from 16" to 26" in diameter. May be used line-traveling or on stationary base. This machine is also available for larger pipe sizes.

**CROSE INTERNAL LINEUP CLAMPS** are available in manual, electric and hydraulic models for pipe sizes ranging from 12" to 36". Crose Internal Lineup Clamps have been proven in world-wide field operations.

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# PIPE LINES

## El Paso Wins

### Interior Department told To let big gas line pass

WASHINGTON. — Federal District Judge Walter Bastian has ordered Interior Secretary Chapman to permit completion by El Paso Natural Gas Co. of its $40,000,000, 450-mile natural-gas pipe line in Arizona.

Judge Bastian, appointed to hear the case when Judge T. Allan Goldsborough died suddenly during the proceeding, ruled that Chapman must issue right-of-way for the last 32-mile stretch of line crossing federal lands.

The department had held that El Paso was trying to evade common-carrier status after agreeing to operate in this manner. The company refused to sign an agreement with the department, objecting mostly to a provision that said it must expand its facilities if necessary to carry other companies' gas.

**Delay works hardship.**—El Paso claimed that the Federal Power Commission, not the Department of Interior, should have jurisdiction over common-carrier duties of a pipe line. Witnesses for the company testified that many people in California and Arizona would suffer severe hardship this winter unless they could get natural gas service held up by the dispute.

J. S. Moulton, vice president of Pacific Gas & Electric Co., said the delay in construction was depriving 1,334,000 California families and 1,100 industries, including defense plants and military posts, of badly needed gas. P. G. & E. has spent $12,000,000 getting ready to handle the gas from the San Juan basin, he said, and added that the shortage in north-central California by next April would be nearly 15 billion cubic feet.

Several towns and gas companies also intervened in the suit on El Paso's side in an effort to get the line completed.

A Senate committee is now studying a bill that would give FPC jurisdiction over public-lands rights-of-way for pipe lines.

## Permian Basin Pipeline Plans Hobbs-to-Hugoton Gas Line

CHICAGO. — A 375-mile natural-gas-transmission line from Hobbs, N. M., to Hugoton gas field is planned for construction by Permian Basin Pipeline Co. (Del.).

Application for a certificate of public convenience and necessity to build the new line, estimated to cost $35,000,000, has been filed with the Federal Power Commission. The company said it also would file with the Railroad Commission of Texas and the Oil Conservation Commission of New Mexico.

The proposed line would be built to serve Northern Natural Gas Co. and other natural-gas, pipe-line firms which originate in Panhandle and Hugoton fields for shipment to existing customers.

The line would consist of about 300 miles of 30-in. line and 75 miles of

*WATER WORK.—Cast-iron river weight being swung into position at creek crossing of Tennessee Gas Transmission Co.'s project near Warsaw, N. Y. This is part of the 24-in. line contracted by H. C. Price Co. on the extension eastward from Buffalo, N. Y.*


18 YEARS'

CRC

PIPE LINE CONSTRUCTION EXPERIENCE

CRUTCHER - ROLFS - CUMMINGS, INC.
Pipe Line Equipment and Supplies
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TO REPAIR PIPE LEAKS—QUICKLY, PERMANENTLY
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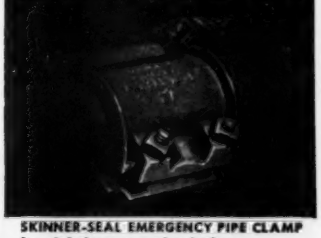

SKINNER-SEAL EMERGENCY PIPE CLAMP for pinhole or corrosion leaks.

SKINNER-SEAL PIPE LINE CLAMP for long splits and bad corrosion leaks.
*In stock—all oil well supply stores*

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# PIPE LINE ECONOMY BEGINS HERE

Steel pipe is expensive—and sometimes scarce. That's why the wise money is on *protection*—not replacement.

NICOLET Asbestos Pipe Line Felt is designed to provide maximum pipe protection plus maximum economy in application.

Because NICOLET Asbestos Felt is made with high quality Canadian chrysotile fibers, which provide great strength in the felt, the complete roll can be used without breakage. And NICOLET Asbestos Felt is non-rotting because it contains a minimum of impurities and organic matter. This assures longer life and better protection for your pipe investment.

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*"the felt with a future"*

*FORMERLY GAMA

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Joining tubes and ducts is usually accomplished with flanges requiring screws and bolts, or with threaded couplings. These are often difficult to assemble and disassemble, expensive to machine or undesirably heavy. Marman V-Band Couplings overcome all these objections. These carefully engineered devices employ positive clamping action around the joint with a quick acting screw takeup. They go on and off fast, are light in weight and require only a simple beaded or flanged end to provide a rigid high-strength seal.

Suitable flanges to accommodate a V-Band Coupling can be made integral with or added to the tubing or ducts to be joined. Rolled sheet metal flanges or machined flanges are equally adaptable. The joint can be used with or without a gasket.

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***Norris Clutch Type Valve Puller Eliminates Extra Pulling of Rods To Pull Lower Valve . . .***

This is no time to waste precious manpower. This is a period that calls for the conservation of labor and the saving of time—and in pumping wells such a policy demands the use of the Norris Clutch Type Valve Puller. As part of your pumping string, this performance-proved device does not retard production or emulsify the oil. But it is ready at a moment's notice to pull the standing valve quickly, safely, positively, thus saving the extra run of the rods and the time and labor it involves.

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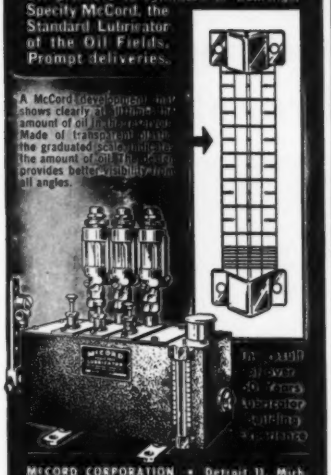
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24-in. with lateral lines of smaller diameters. Initial capacity would be 300,000,000 cu. ft. per day.

Permian Basin Pipeline, formed in June to build the line, said the line presently is scheduled to begin early in 1952 and to be completed by September 1952.

The company said it had recently executed a contract for purchase of gas from "one of the largest gas producers in Lea County, New Mexico," and is now negotiating purchase contracts with other producers in the Permian-basin area.

W. D. Gay, Kansas City, Mo., is president of the new company. A group including Glore, Forgan & Co. and Stone & Webster Securities Corp. has organized and is sponsoring it. Headquarters are in Chicago.

## Williams Brothers-Davis Was Formed in May of Last Year

WILLIAMS BROTHERS-DAVIS CO., one of the newest entrants into the pipe-line-construction business, now has two large spreads and two small spreads in operation in several states. The company was formed in May of last year and its operations are supervised from company headquarters at 6006 Humble Road, Houston.

H. L. DAVIS

**Personnel.** — Officers of the company are Herman Lee Davis, president; John H. Williams, vice president; Charles P. Williams, vice president and treasurer; E. G. Thiel, secretary; and James N. Chance, assistant secretary and general office manager. Superintendents for the firm include R. G. Hamilton, J. H. McCartney, and S. M. Williams, III.

**Present projects.**—The 165-mile, 30-in. gas line of Texas Eastern Transmission Corp. from Kosciusko, Miss., to Florence, Ala., is being laid by Williams Brothers-Davis. R. G. Hamilton is in charge of the project. J. H. McCartney is supervising the installation of a river crossing for Transcontinental Gas Pipe Line Corp. at New Roads, La. The company is also lifting and repairing a 24-in. line at the same crossing. The third major current

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# Efficient Gasoline Sweetening Process Uses Eductor to Mix Slurry with Petroleum

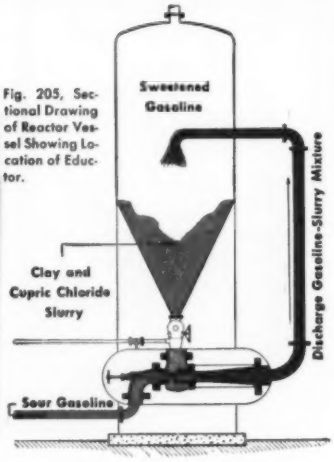
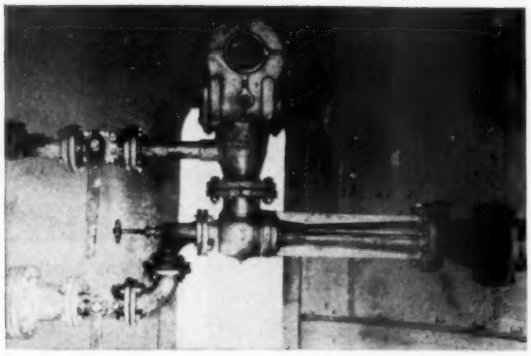



Fig. 205, Sectional Drawing of Reactor Vessel Showing Location of Eductor.



SK 4" Fig. 205 Jet Eductor Used to Mix Distillate and Cupric Chloride Slurry.

A recent issue of OIL & GAS JOURNAL contained an article which described, in detail, a significant application of the copper sweetening of sour gasoline at the El Dorado, Kansas, refinery of Skelly Oil Company.

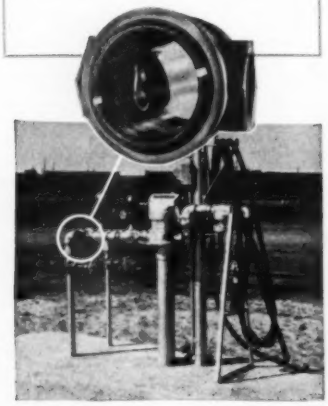
As a part of this process, Skelly engineers have incorporated an SK Fig. 205 Jet Eductor to entrain and mix slurry with liquid and discharge against counter pressure—an operation for which this type of eductor is particularly well adapted. The eductor is located at the base of the cupric chloride reactor at the apex of the conical bottom of this vessel.

As shown in Fig. 205, the material to be treated—distillate which has been made moisture-free in a salt tower and which has been heated above initial temperature in a heat exchanger—is used as the pressure liquid. The velocity of the distillate issuing from the eductor nozzle entrains the slurry reagent—a mixture of Attapulgus clay, cupric chloride crystals and water—and the two are mixed intimately in the throat of the eductor. The mixture issues from the eductor into a transfer line which leads back into the reactor where the mixture is discharged. Action is continuous.

The treated distillate, taken from the top of the reactor vessel through a 4" pipe, is later washed with water, separated from the water in a settling tank, and is then moved to a second salt tower where any remaining traces of water are removed. From here, the sweet, treated product goes into storage.

*For complete details on all types of SK Jet Eductors and their characteristics, request Bulletin 2-M.*

SK Flapper-Type Flow Indicators indicate flow of a gas or liquid by means of a hinged flapper. They are widely used on butane-propane service to show flow or to indicate leaks. *Available from stock, this type of Flow Indicator and other types are described in detail in Bulletin 18-W, copies of which are available upon request.*



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REPRESENTATIVES IN PRINCIPAL CITIES

project is testing the newly laid Texas Illinois Pipe Line Co. line. The testing includes both the main line and laterals.

Work which has been completed by the firm in the past year includes a 30-in. loop for Transcontinental from Humble to El Campo, Tex. Also completed was a 60-mile, 4-in. line from Sweeny to Texas City, Tex., for Pan-American Refining Corp.

**Davis' career.**—Herman Lee Davis, president of the company, has been active in pipe lining since 1924. In 1927, he went to work for Williams Bros. Corp. as pipe foreman and remained with that company until assuming his present position. At the time he left Williams Bros., he was general superintendent for the company. Just prior to the formation of the new company, Davis spent 2½ years in Mexico in charge of building and operating a 20-in. gas artery from Poza Rica to Mexico City. He also built and operated the gas distribution system of Mexico City.

James N. Chance, who is the only other officer of the company in the Houston headquarters, also has a wide industry background. He was associated with O. E. Dempsey Construction Co., Tulsa, for 8 years before joining Williams Brothers - Davis. Earlier work of Chance included 13 years with British-American Oil Co.

## Northern Natural Gets O.K. To Expand to 650,000 M.c.f.

WASHINGTON.—The Federal Power Commission has authorized temporarily construction of natural - gas, pipe-line facilities by Northern Natural Gas Co., Omaha, which will increase capacity of the company's transmission system north of Kansas by 50 million cubic feet per day to a total of 650 million cubic feet.

The o.k.'d facilities, including 79.5 miles of lines and 27,200 hp. in compressors, are part of a larger expansion program planned by Northern and now before the commission which would enlarge the company's capacity north of Kansas to 825 million cubic feet.

The entire construction program is estimated to cost $33,095,000. It consists of a total of 221.8 miles of pipeline additions in Texas, Oklahoma, Kansas, Nebraska, and Minnesota, and compressor additions totaling 84,000 hp. in Texas, Kansas, Nebraska, and Iowa.

One of the important questions is whether Northern has sufficient quantities of gas to meet future requirements, the commission said. A hearing on the company's original application will commence September 17 in accordance with an order to be issued subsequently.


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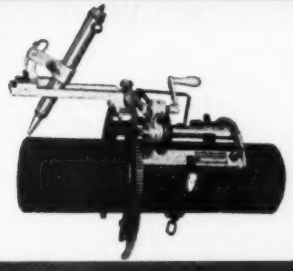
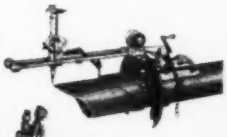
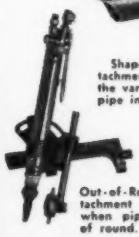


ATTACHMENTS



Shape Cutting Attachment for cutting the various shapes of pipe intersections.



Out-of-Round Attachment is used when pipe is out of round.

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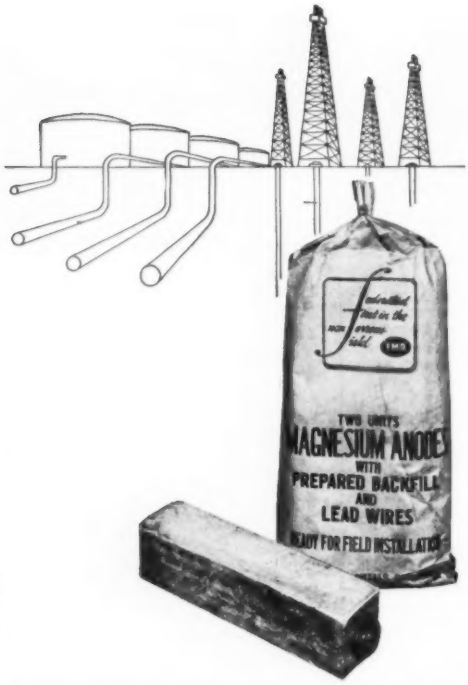
portability . .

H&M PIPE BEVELING MACHINE COMPANY

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Federated Magnesium Anodes are available in all standard sizes . . . a variety of special sizes can be had at little or no extra cost. Federated engineers will gladly give technical service on your installation problems.

To assist further those engaged in cathodic protection of pipelines, Federated has developed a Magnesium Anode Cathodic Protection Guide in convenient slide rule form. With this you can determine anode current output, length of pipe protected, required anode weight, and anode life when soil resistivity and pipe diameter are known. Write Dept. SR now on your company letterhead for your copy.

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# NATURAL GAS

## FPC Examines Transco's Proposal for Big Rate Hike

WASHINGTON.—The Federal Power Commission has started its examination of an application filed by Transcontinental Gas Pipe Line Corp. asking a $16,350,000 increase in rates for wholesale natural-gas service.

The proposed 20 per cent increase is the largest ever proposed to the commission by a natural-gas company. It would affect customers purchasing gas from Tennessee in the states of Louisiana, Mississippi, Tennessee, Kentucky, West Virginia, Ohio, Pennsylvania, and New York.

The company has proposed that the higher schedule take effect July 16. It is the first increase asked by Tennessee since the company was organized in 1944.

In Houston, Gardiner Symonds, company president, said that marked increases in state and federal taxes and in labor costs have made application for an increase in rates necessary. Texas, where the company bought 98 per cent of its gas last year, recently levied a .45-cent per M.c.f. gathering tax on natural gas. *(The Oil and Gas Journal, June 14, page 57).*

## Senate Group Shelves Bill On Underground Gas Storage

WASHINGTON.—The Senate committee on interstate and foreign commerce has postponed action on the Douglas - Dirksen bill which would give natural-gas companies the right of eminent domain in seeking properties for underground-storage facilities.

The action was delayed on request of Senator Hunt of Wyoming who wanted to check the matter with members of the Wyoming commission and others.

Some of the members of the committee suggested that the bill was a little far-reaching, and more time was needed to study it before voting. No date was set for action on the bill.

## Gas-Sales Figures Continue Upward Climb During April

NEW YORK.—Utility sales of natural gas to ultimate consumers during April increased 19 per cent over sales during the same month last year to 4,151 million therms.

The American Gas Association reports that sales of natural gas during the 12 months ending April 30 of this year also were up 18.7 per cent to 35,724 million therms over the same period a year ago.

The April figure for sales of both natural and mixed gas advanced to 4,473 million therms, a rise of 16.7 per cent over that month's sales of 3,833 million therms last year.

Sales of manufactured and mixed gas were off 7.1 per cent, declining to 321.3 million therms. The rise in sales of natural gas and the drop in other forms reflect the conversion of a number of utilities from distribution of manufactured or mixed to straight natural.

Operating revenue of natural-gas companies reporting to the Federal Power Commission totaled $139,065,-864 in April, an increase of 16.4 per cent over the $119,506,815 reported for April 1950.

Gas - utility operating income for the month was $24,843,401, up 1.5 per cent, and gas-operating-revenue deductions amounted to $114,323,874, up 20.2 per cent. Operating expenses accounted for $82,472,867, up 14.5 per cent; depreciation for $9,962,789, up 17.6 per cent; and taxes for $21,888,-218, up 50 per cent.

# Natural Gasoline

## Snyder Plant in Scurry County Ships First L.P.G.

SNYDER, Tex. — Snyder gasoline plant in Scurry County, Texas, has shipped its first L.P.G. products.

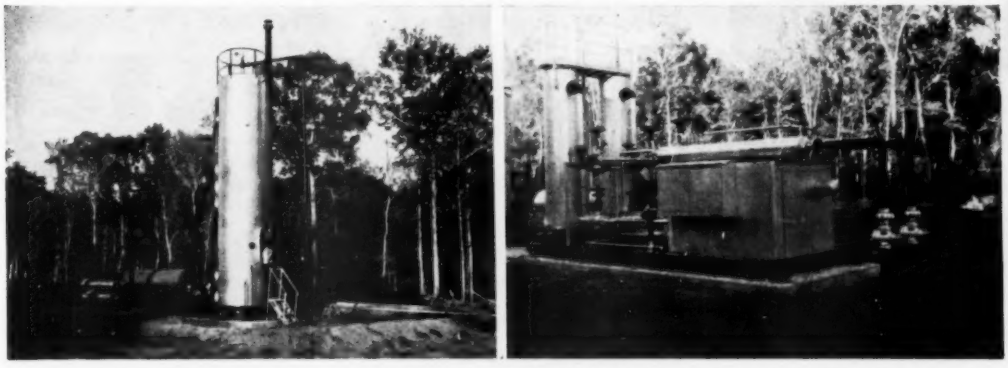
H. W. Manley, vice president of Sunray Oil Corp., builders and operators of the plant for 30 companies and 60 individual coowners, said that the new plant will produce 50 to 60 car loads or about 450,000 gal. of propane, butane, isobutane, and natural gasoline per day. All plant facilities are expected to be in operation early in July.

The $8,000,000 plant will process 70,000,000 cu. ft. of gas per day. Construction was begun in October 1950.

About 4 billion cubic feet of gas is estimated to have been saved in the last year with the installation of the high-pressure gas-gathering system. The system gathers gas from 850 wells on 35,000 acres in the Kelly-Snyder area. It otherwise would have been flared.

Gas thus saved has been delivered through the gathering system to gas and pipe-line companies since last July.

The completed plant will have a two-stage gas-gathering system, 57 automatic drip - condensate installations in the low-pressure gas-gathering system, a deethanizing absorber, and supercharged engines developing 20 per cent more horsepower than conventional installations.



***PROCESSING EQUIPMENT.**—Gas-distillate production in new Lottie field of Pointe Coupee Parish, Louisiana, is handled by this modern processing equipment. At left is two-stage, horizontal separator and treater. A skid-mounted dehydration unit, rated at 5,000 M.c.f. per day and mounted on a concrete block appears at right. The installations are on Lottie Land & Development Co. lease, Section 25-6s-9e, operated jointly by The Texas Co. and Sinclair Oil & Gas Co.*

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# Among the Drilling Contractors

## Active Rigs Increase To New Record Level

Increased drilling activity in various areas boosted the total number of operating rotary rigs in the United States and western Canada to a new all-time record during the week ended June 25 (latest survey). The total of 2,680 rigs reported represented a gain of 49 during the week, and was 40 greater than the previous record number of 2,640 rigs reported running during the week ended June 4.

Most notable increases in activity were in Oklahoma, Kansas, and the Rocky Mountain region. Drilling in the West Texas-New Mexico area continued at record levels, due to the intensified development along the Spraberry trend. For the entire region, there were 368 more rigs running than during the corresponding week a year ago.

**ACTIVE ROTARY RIGS***
(United States and Western Canada)

| Area— | Week ended 6-25-51 | Change week ended 6-18-51 | Change week ended 6-26-50 |
|---|---|---|---|
| Gulf Coast | 506 | + 4 | + 75 |
| W. Tex.-N. M. | 889 | + 3 | +145 |
| Ark.-N. La.-E. Tex. | 154 | 0 | + 4 |
| Oklahoma | 289 | +29 | — 24 |
| Kansas-Nebraska | 185 | +16 | + 51 |
| Illinois-Eastern | 140 | —22 | — 11 |
| Rocky Mountains | 166 | +16 | + 68 |
| Pacific Coast | 143 | 0 | + 14 |
| Total U. S. | 2,552 | +46 | +322 |
| Western Canada | 128 | + 3 | + 46 |
| Total | 2,680 | +49 | +368 |

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States and the Gulf Coast and Arkansas-North Louisiana-East Texas areas are shown on pages 132 and 133.

## New Drilling Company

Victor F. Reiserer, formerly district geologist for Superior Oil Co. in Kansas, and V. R. Gallagher, president of Gallagher Oil Co., Evansville, Ind., have organized Victor Drilling Co., Inc., with headquarters at Wichita, Kans. The new company, of which Gallagher will be president, and Reiserer, vice president and general manager, will engage in drilling contracting and independent producing operations.

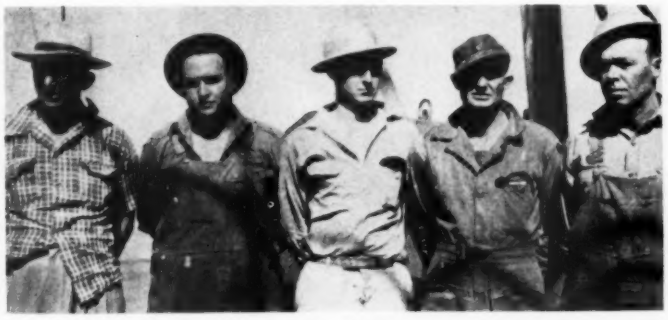
## Gangwer in Colorado

R. C. Gangwer, formerly of Evansville, Ind., has opened offices in Fort Morgan, Colo., in which area he will operate as a drilling contractor and independent producer. He is moving a rig to the area from Texas.

**W. H. Sherin & Son,** Oklahoma City, will drill for Peppers Refining Co. at 1 Teuscher, NW NE SW 30-15n-1w, a projected wildcat test located northwest of Coon Creek pool, Logan County, Oklahoma.

**Miller & York,** Bakersfield, Calif., contracting for Ted Sterling and associates, will drill a Bolton sand test at a wildcat location about 2 miles northwest of the McDonald Anticline field, Kern County, California.

**Phil O'Neal** is doing the drilling for Stephens Petroleum Co. on a lease he farmed out to that company in the new producing area opened by H. C. Bundy and associates east of Southeast Garber pool in Garfield County, Oklahoma. Currently, he is working



*On the floor of one of the two large rigs Big Chief Drilling Co., Oklahoma City, is running in the Elk City field, Beckham and Washita counties, western Oklahoma. Left to right: Emmett Stufflebeam, toolpusher; Jack Pearse, motorman; Dean Bloomer and Creyton Davis, floormen; C. L. McKee, driller. Bart Dowdy (not shown) is derrickman for this crew.*

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The MISSION "Super Service" Liner rounded out the famous MISSION team of expendable slush pump parts. It is accurately bored, **induction** hardened to **uniform** case thickness, precision honed, and "Satin Finished". These MISSION parts constitute a perfectly mated **team, unbeatable** for reliability, efficiency, economy. Your supply store handles them . . . Mission Manufacturing Co., Houston, Texas. Export: 30 Rockefeller Plaza, New York. European Address: London, England.

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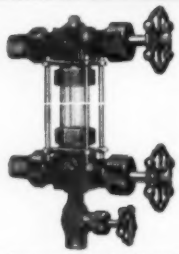

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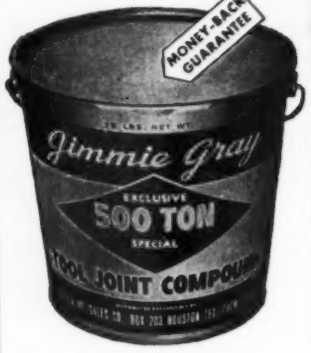


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on a southwest diagonal offset location (1 Schweer) to the discovery well, completed in the Crews sand, perforated at 2,171-81 ft. Location is in the NE NE SE 4-21n-3w.

**Nucholls-Bell Drilling Co.,** Oklahoma City, is starting another well for Bay Petroleum Co. in Lucien pool, Noble County, Oklahoma. Latest operation is 1 Earl Smith, NE NE SW 29-20n-2w.

**Dorris Ballew, Inc.,** Natchez, Miss., is starting a 6,500-ft. Wilcox sand test 2 miles west of Elmo, Jefferson County, southern Mississippi. The well, 1 Guice, in 40-8n-2e, is being drilled on contract for G. A. Clements and G. G. Standord.

**W. C. Watkins,** Holdenville, Okla., is the contractor on a projected 2,200-ft. test which Ray Burgin, independent operator, is drilling in the SE NW NW 35-4n-4e, near Vanoss, Pontotoc County, Oklahoma.

**R. M. Bass,** Kilgore, Tex., is the contractor on a wildcat test which Humble Oil & Refining Co. is drilling at 1 Marberry, in the S. P. Flint Survey, 6 miles northeast of Kirvin, Freestone County, East Texas.

**Loffland Brothers Co.,** Tulsa, has a rig working for Shell Oil Co. on the latter's LeRoy block in Uinta County, Wyoming. Current operation is 3 Unit in the NE NW NW 33-16n-117w.

**McDannald Drilling Co.,** Houston, has a rig in the Atwood area, Logan County, Colorado, where it is drilling for Ginther-Warren-Ginther, also of Houston, at 1 State, SW SE SE 20-7n-53w. Location of this new operation is northeast of the Merino pool.

**Reeves Drilling Co.** is the contractor on a projected Wilcox sand test which Sun Oil Co. has projected for the area about 3 miles north of Shawnee, Pottawatomie County, Oklahoma. The test is 1 Allenbaugh with location in the NW SE SE 18-11n-4e. Objective is expected around 5,500 ft.

**Altus Drilling Co.,** Oklahoma City, is starting a projected 6,000-ft. wildcat test for Fle-pel Oil Co., also of Oklahoma City, at the east edge of Guthrie, Logan County, Oklahoma. Location is on the operator's Ward lease in the C SE SE 10-16n-2w.

**Thomas P. Pike Drilling Co.,** Los Angeles, which has been carrying on an exploratory drilling program in the Reynosa area of northeastern Mexico under contract with Edward W. Pauley, has contracted for two additional deep wells. Locations are about 12 miles south of Reynosa, just across the Rio Grande River from McAllen, Tex. The contractor maintains headquarters at Reynosa with Joe Smith as toolpusher in charge.


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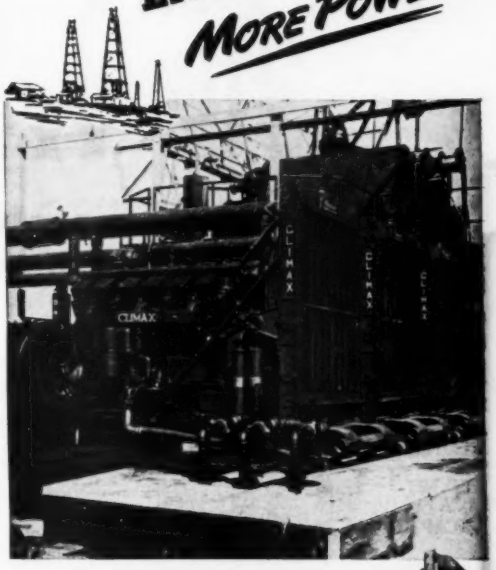


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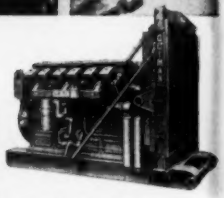

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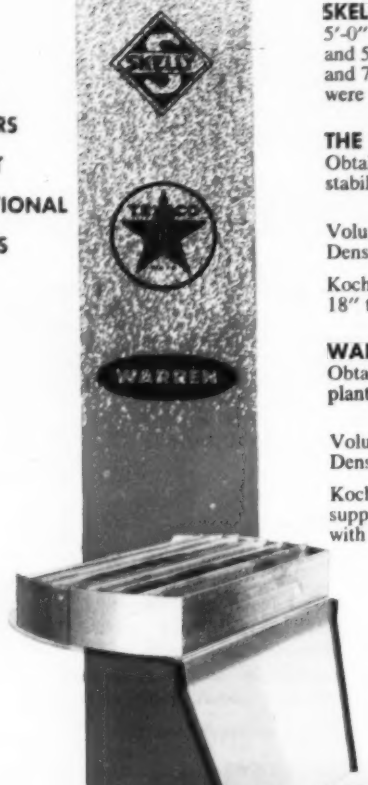


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5'-0" diameter, 265# psig. absorber handling 33MM.CF/D and 500 gpm lean oil with 45.5% tray efficiency, basis $IC_4$. and 73.3% tray efficiency, basis $NC_4$. Koch Kaskade trays were installed on 26" spacing.

**THE TEXAS COMPANY**
Obtained increased thruput on 3'-0" diameter. 285# psig. stabilizer to capacities of:

| | LIQUID | VAPOR |
|---|---|---|
| Volume | 450 gpm | 0.80 to 2.5 CF/S |
| Density #/CF | 33.1 | 3.48 |

Koch Kaskade trays were installed on existing supports—18" to 24" spacing—now operating with excellent results.

**WARREN**
Obtained increased capacity of a 3'-6" diameter, gasoline plant depropanizer to:

| | LIQUID | VAPOR |
|---|---|---|
| Volume | 471 gpm | 7.09 CF/S |
| Density #/CF | 21 | 2.64 |

Koch Kaskade replacement of bubble trays, using existing support rings on 24" spacing, has increased the thruput with a bonus of increased separation efficiency.

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# REFINING

## Odessa, Tex., Chosen Site For Big Gilmore Refinery

ODESSA, Tex.—This city has been chosen as site for "the first California refinery located in Texas." *(The Oil and Gas Journal, June 14, page 59).*

Officials of Gilmore Refineries, Inc., Long Beach, Calif., and Progress Pacific Pipe Line Co., Los Angeles, made the announcement after conferring with Odessa oil man W. D. Noel and a party representing the city's chamber of commerce.

The big project, as announced, would include the construction of a $20,000,000 refinery with an initial capacity of 25,000 bbl. per day and two pipe lines, one crude and one products, estimated to cost about $120,000,000.

The refinery would include a crude unit, a catalytic reformer, a catalytic cracking unit, a catalytic polymerization unit, and a desulfurization unit.

Provisions will be included in the original design for doubling the plant's capacity.

The new crude line would be 24-in. and extend from Odessa to the Los Angeles Harbor area. The 12¾ to 16-in. products line would parallel the crude line.

Progress Pacific said design and specifications are now being drawn for the two pipe lines.

Gilmore did not ask for a government loan for construction of the refinery, explaining that financing was fully arranged.

## Richfield Secures Right to Build Catalytic Reformer

PHILADELPHIA. — Richfield Oil Corp. has just signed a patent-license agreement with Atlantic Refining Co. which will permit the construction of a catalytic reforming unit employing the Atlantic process at Richfield's 100,000 bbl. per day refinery at Watson, Calif.

The company contemplates building a unit with a charge capacity of 6,000 bbl. per day. Closely fractionated feed stocks will be converted to benzene and aromatic-avgas blends.

The Atlantic announcement also stated that Sinclair Refining Co. has acquired the right to proceed with construction of installations using the process. Sinclair engineers are now studying the economics of catalytic reforming but have not yet decided on any specific unit.

## Construction to Start Soon On First Fluid Hydroformer

NEW YORK. — Process design has been completed, and construction is scheduled to start soon on the first fluid hydroformer, a 2,000-bbl. unit at Pan-Am Southern Corp.'s Destrahan, La., refinery, M. W. Kellogg has announced. *(For process description see The Oil and Gas Journal, June 14, page 53).*

The new plant will be able to convert 55-octane virgin gasolines into a product with an octane rating of 95 CFR-R (Clear) under severe operating conditions, according to Kellogg.

Operating for the prime purpose of producing avgas base stocks, the unit will produce a product with octane ratings reaching 98, F-3, and over 175, F-4, with the addition of 4.6 cc. of TEL per gallon, the company said.

Daily operating costs of the new process are claimed by Kellogg to be approximately 30 per cent lower

**NELSON REFINERY CONSTRUCTION INDEX**

**Appears in the first issue of each month.**
**Explanation—Cost-imating No. 61, December 15, 1949, pages 91, 92.**
**Compiled by W. L. Nelson—Refinery Consultant—Tulsa.**
**Indexes of Individual Equipment Items—January, April, July, and October.**

**INDEX (1946 = 100)**

| | 1947 | 1948 | 1949 | 1950 | March 1951 |
|---|---|---|---|---|---|
| Centrifugal pumps | 109.0 | 120.0 | 118.9 | 128.1 | 136.2 |
| Reciprocating pumps | 128.5 | 138.1 | 144.6 | 143.9 | 183.3 |
| Compressors | 114.0 | 128.0 | 120.0 | 118.8 | 138.1 |
| Engines | 109.0 | 120.0 | 115.6 | 117.9 | 137.1 |
| Motors | 110.0 | 112.7 | 114.0 | 130.8 | 148.8 |
| Transformers | 116.0 | 116.0 | 116.0 | 116.0 | 130.5 |
| Instruments | 113.0 | 120.0 | 122.0 | 127.8 | 142.4 |
| Miscellaneous equipment avg. | 114.2 | 122.1 | 121.6 | 126.2 | 145.2 |
| Materials component | 122.4 | 139.3 | 143.6 | 149.5 | 164.4 |
| Labor component | 113.5 | 128.0 | 137.1 | 144.0 | 150.0 |
| Refinery construction index | 117.0 | 132.5 | 139.7 | 146.2 | 155.8 |


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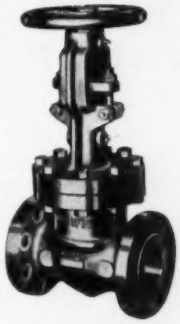

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than those of a fixed-bed unit with the same capacity. In addition, it is estimated to cost about one-third less to build for equivalent capacities.

Yields are reported to be from 3 to 5 per cent higher, due principally to the uniform-temperature arrangement incorporated in the process. The process also shows better liquid-recovery as a result of more moderate reactor pressures, Kellogg said.

The final gasoline product is said to contain less butane. This will make feasible the blending of extraneous butanes from other refinery sources into hydroformed gasoline in bringing it up to the permissable 10-lb. R.v.p.

## New Ion-Exchange Unit for Water Treating Developed

NEW YORK.—A new, simplified design in ion-exchange units for treating boiler-feed water and processing water in refineries eliminates the need for caustic soda, sulfuric acid, and hydrochloric acid for regeneration. Termed the "Dual Bed" Ion Exchanger, the unit consists of a single tank. New type resins are regenerated with plain salt.

As contrasted to the mixed-bed type of unit, the new double-bed unit holds the anion and cation resins separately. In addition to removing the "hard" chemical salts of calcium and magnesium, the new principle permits removal of alkalinity and of naturally occurring sulfates. The new ion-exchange unit was developed in the research laboratories of Permutit Co. of New York.

## Naugatuck Plans Expansion Of Synthetic-Rubber Plant

BATON ROUGE.—Naugatuck chemical division, U. S. Rubber Co., has announced impending construction to double the capacity of its recently acquired synthetic-rubber plant here.

Making the "N-type" of synthetic rubber, the expanded plant, when completed in early 1952, will have a capacity of about 30,000,000 lb. annually or about 37.5 long tons per day. This will represent an increase of about 50 per cent in nitrile-rubber production in this country.

Products will include Paracril nitrile rubber, Nitrex latex, high-styrene latex, and high-styrene resins. Principal uses for Paracril rubber are for self-sealing fuel tanks, bullet-sealing hose for military aircraft, and oil-resistant rubber products.

The Baton Rouge plant, which produced the first GR-S synthetic rubber commercially, was purchased from Esso Standard Oil Co. late last year. In addition to doubling reactors, drying units, and other production facilities, Naugatuck will add a new administration building, a new laboratory, and a new gate house.


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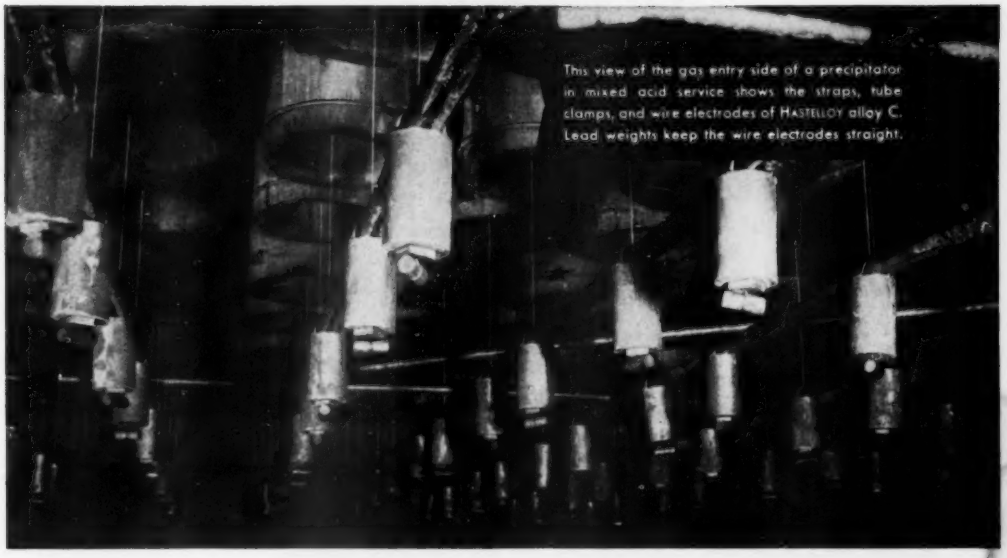

This view of the gas entry side of a precipitator in mixed acid service shows the straps, tube clamps, and wire electrodes of HASTELLOY alloy C. Lead weights keep the wire electrodes straight.

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HASTELLOY alloy C electrodes have been installed in mist precipitators where hydrochloric, sulphuric, sulphurous, and mixed acids were present. A recent check on an installation in an acid plant showed that the alloy C wires experienced no weight loss after a year's operation. Lead-covered steel wires, on the other hand, lasted an average of 11 months with electrode failure at least once a week.

For information on wrought forms of HASTELLOY alloy, write for the booklet, "HAYNES Wrought Alloys Price List."

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# Interest in McAlester Basin Revives

A REVIVAL of interest in the possibility that substantial oil production may yet be found in the McAlester basin is rapily developing.

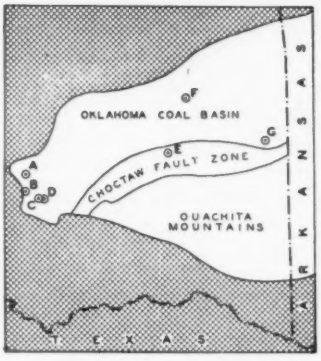
This basin, also called the Oklahoma Coal basin, is the westward extension of the Arkansas River geosyncline which continues eastward into Arkansas. Until now this basin has been almost entirely disregarded in the search for oil since about 1930, at which time some 20 years of wildcatting had failed to find more than small scattered gas fields.

Current accelerating interest stems from unofficial reports that Coal Oil & Gas Co. 1 Styron, 27-1n-9e (D on map), in East Oconee gas-distilliate field is flowing high-gravity oil or distillate through a small choke at the rate of over 250 bbl. daily from the Oil Creek (Ordovician-Simpson) at about 7,500 ft. This interest is reflected in greatly increased lease and royalty values in the vicinity of the discovery.

The two producing gas - distillate wells at East Oconee are completed in the McLish (also Simpson, but overlying the Oil Creek) at about 7,200 ft. Each of these wells has pinched production of about 2.5 M.M.c.f. gas with roughly 15 bbl. distillate per M.M.c.f.

According to testimony brought out at a recent spacing hearing before the Oklahoma Corporation Commission, the East Oconee structure is a long, northwest-southeast trending anticline with about 600 ft. of closure. The structure is interpreted to be associated with the fault system developed in the area of Fitts field, which lies a few miles to the west and north. Production at Fitts is from various members of the Pennsylvanian and Siluro-Devonian as well as Ordovician, which could mean that the East Oconee structure has potentialities in more than just the deeper rocks.

Various theories have been advanced to explain the absence of oil production in the McAlester basin. One has been the fixed carbon ratio theory which, though disproven locally, is still considered by some to be valid through this area. Another idea, and this also continues to retard exploration, has been that Pennsylvanian sediments show evidence of having been deposited under shallow water conditions that were inhospitable




to marine life. Pre-Pennsylvanian sands, though more typically marine than younger sediments, have not been considered attractive throughout most of the basin because the few wells that have cut these rocks found them tight and silicified.

There are, however, many factors that indicate oil possibilities in a substantial part of the basin are favorable. The occurrence of gas throughout most of the basin area can not be overlooked as a favorable indication that oil may be present. Structures in the area are plentiful. There is evidence that anticlines were growing during the deposition of the Pennsylvanian - Atoka formation which means that porosity wedges in Atokan sands were probably developed around at least some of these structures.

A wildcat that may be a forerunner of a new approach to the problem of the McAlester basin is Superior Oil Co. of California 73-18 Allred, 18-8n-20e, F on map. This wildcat is being dug off the north flank of the Kinta anticline. The 20-mile long structure is an asymmetrical fold with 150-200 ft. of closure. Gas production is not obtained from the crest of the structure, but comes from Pennsylvanian - Hartshorne wells located on the westward plunging dip south of the axis. What Superior finds in its 7,500-ft. test on the other side of the axis could be extremely enlightening.

Other wildcats now drilling in the basin are: (A) Paul Kollsman 1 Miller, 32-3n-8e; (B) Wabash Oil Co. 1 Fisher, 4-1n-8e; (C) W. A. Delaney, Jr., 1 Smith, 29-1n-9e; (E) G. R. Hayes 1 Bennett, 12-4n-18e; and (G) LeFlore County Gas & Electric Co. 1 Wilson, 23-5n-25e.

*Philip C. Ingalls.*

## HIGHLIGHTS OF WEEK'S DEVELOPMENTS

**WEST TEXAS.**—Ashland Oil & Refining Co. 1-48 Sherrod extended Spraberry production 2 miles southeast of North Pembrook field, flowing 188 bbl. of oil on potential, and McFarland 1-28 Leonard Proctor extended Weiner-Floyd pool 1¼ miles southeast with a potential of 215 bbl. In Midland County, Sinclair pushed Ellenburger production 1½ miles north at its 7-C June Tippett Sanders.

**EAST TEXAS.**—Near Sandusky, L. O. McMillan had a confirmation well in prospect for his McMillan-Oil Creek pool discovery. Southwest of Hagerman, Humphrey 1 Barnes developed oil on drill-stem tests in a deep zone which may be the Ellenburger.

**SOUTHWEST TEXAS.**—A new drilling play has been touched off in Val Verde County by a big gas strike. Potential at R. J. Caraway 1 Guida Rose, GC&SF Survey 2, has been established at 35,000,000 cu. ft. of gas, open flow. Production is from the Strawn at three intervals below 10,050 ft.

**TEXAS GULF COAST.**—Ohio Oil Co. may make Phoenix Lake field in Calcasieu Parish, Louisiana, a two-state area. The company's 1 Lutcher-Moore Lumber Co., Orange County, Texas, flowed oil on a drill-stem test at 7,980-90 ft. This extension try is located 1¼ miles southwest of the Louisiana field.

# California

## Richfield Leases Big Tract South of Midway-Sunset

LOS ANGELES.—Richfield Oil Corp. has leased 3,852 acres in the San Emidio area of Kern County from Kern County Land Co. and will soon start the first of several prospect wells on the property which lies in Sections 19, 20, 21, 26, 27, 28, 29, 30, 33, 34, 35, and 36, Township 11n-23w.

The land company usually requires immediate drilling and Richfield is expected to file its first location some time this month. The big lease is immediately south of the Santiago area of Midway-Sunset field where Western Gulf Oil Co. made a substantial discovery of 23°-gravity oil about 6 years ago.

Speculation over deeper sand possibilities in Buena Vista Hills field in Kern County may be settled by Standard of California's projected deep test in Section 27-31s-23e, which will explore the Stevens sand expected at approximately 7,600 ft.

The location is about 7 miles northwest of a deep test drilled about 10 years ago by Honolulu Oil Corp., which took its 10-25P in 10-32s-24e to 14,622 ft. before abandoning the well in silty, hard sand, probably of Vaqueros (lower Miocene) age. Silty sands from 5,900-6,500 ft., equivalent to some portion of the Stevens zone of fields to the east were fairly well-saturated with oil and gas, but were too tight to produce when tested. Other oil and gas showings occurred from 6,750-7,550 ft.

Interest in the Cuyama Valley centered this week in Richfield Oil Corp.'s location for a wildcat ¾ mile east of the southern end of the Russell Ranch field where the company will drill 23-9A in Section 9-10n-27w. Several Richfield tests drilled within 2 miles east of the new location have failed to find the pay so the company has moved in closer to production.

Another attempt will be made to extend production in Taylor Canyon field in the northwestern part of Cuyama Valley by Universal Consolidated Oil Co., which has staked site for 55A-31 Humble in 9-32s-20e. This test falls about 40 ft. south and 83 ft. west of its 55-31, abandoned last December at 5,444 ft.

Prospecting in the San Ardo area of Monterey County has been stimulated by the recent completion of General Petroleum Corp.'s pipe line from the San Ardo field to tidewater. Approximately 5 miles northeast of production, Helm Co. will drill 1 Adrian-Orradre in 31-21s-11e. San Ardo oil began flowing through the General Petroleum pipe line last week.

New well locations filed to date this year with the California Division of Oil and Gas are running about 43 per cent higher than last year to the same date. Locations filed this year total 1,197 ft., compared to 839 at the same date last year.

**CALIFORNIA UNSUCCESSFUL WILDCATS**

Yuba County, Marysville area: D. D. Feldman Oil & Gas Co., 1 Farm Lands, 7-13n-4e, dry, TD 3,410 ft., elev. 50 ft.

Kern County, West Elk Hills area: Universal Consolidated Oil Co., 88-4 Callahan, 4,30s-22e, dry, TD 3,670 ft., elev. 693 ft.

McDonald Anticline area: Murphy Bros., Ltd., 2 MST Theta, 2-28s-19e, dry, TD 5,565 ft., elev. 1,025 ft.

East Tejon Hills area: G. A. Grober, 1 Grober-Ivanhoe, 18-11n-17w, dry, TD 431 ft., elev. 1,235 ft.

East Tejon area: Standard Oil Co. of California, 57-36 Tejon Ranch 13, 36-11n-19w, dry, TD 2,000 ft., elev. 889 ft.

O. M. Slosson, 19 Tejon, 22-11n-18w, dry, TD 475 ft., elev. 978 ft.

O. M. Slosson, 19-A Tejon, 22-11n-18w, dry, TD 478 ft., elev. 977 ft.

San Luis Obispo County, Cuyama Valley area: Richfield Oil Corp., 78-30A- F. R. Anderson, 30A-11n-27w, dry, TD 3,750 ft., elev. 1,838 ft.

Richfield Oil Corp., 87-36 F. R. Anderson, 36-11n-28w, dry, TD 5,241 ft., elev. 1,959 ft.

Santa Barbara County, North Elwood area: Carlton Beal, 2 Dreyfus, 8-4n-29w, dry, TD 4,400 ft., elev. 286 ft.

Los Angeles County, Santa Fe Springs area: Union Oil Co., 110 Bell, 32-2s-11w, dry, TD 4,541 ft., elev. unknown.

# Texas Gulf Coast

## Orange County Discovery May Extend Louisiana Field

HOUSTON.—Ohio Oil Co. is swabbing its new oil discovery in Orange County, 1 Lutcher-Moore Lumber Co., located ½ mile south of Orange. Hole is bottomed at 9,038 ft. with 7-in. oil string cemented at 8,071 ft.

The well flowed on drill-stem test conducted at 7,980-90 ft. At last report, operator perforated 7,983-87 ft. and is now swabbing with the fluid level 1,500 ft. from the surface. Casing pressure is 900 psi. This well is located 1¼ miles southwest of Phoenix Lake field in Calcasieu Parish, Louisiana, and may be considered an extension to the field.

New deep pay has been established in the northeast flank of Port Neches field, Orange County, at The Texas Co. 5 Polk Kuhn Glass. On potential test, through 8/64-in. choke the well flowed 1,570,000 cu. ft. of gas per day through perforations in the Hackberry zone at 7,74-92 ft. On open-flow gage, the well made 42,000,000 cu. ft. of gas daily. Hole is bottomed at 8,025 ft. with 5½-in. casing cemented at 7,881 ft. Deepest production in the field up to the present time is oil from the 6,000-ft. zone. The field is also productive from shallow horizons.

The second producer from the Jackson sand in the northeast extension area at Weesatche field, Goliad County, has been completed at Superior Oil Co. 1 Tom K. Webb, et al, Joseph Simons Survey. The well pumped 30 bbl. of 43.4°-gravity oil per day through perforations at 3,848-54 ft. Sand with gas-condensate odor was logged at 4,701-14 ft. and 4,733-45 ft. in the Yegua zone.

After testing salt water in the first and second sands of the Cockfield formation, Sparta Oil Co. and associates, are drilling below 7,700 ft. to test the Wilcox in 1 Lawrence A. Johnson, wildcat, 7 miles south of Rock Island in Colorado County. Salt water sands (Cockfield) were cored from 5,630-36 ft. and 5,676-5,702 ft. The wildcat is located in I&GN Survey, Abstract 312.

**TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCATS**

DeWitt County: Wilcox gas-condensate discovery—George W. Graham, et al, 1 O. L. Caruthers, H. M. Sally Sur., A-417, TD 7,562 ft., perf. 7,452-58 ft., IP: 56 bbl. of condensate per day, 54° gravity, 10/64-in., TP 2,450 psi.

Jackson County: Gas discovery — Curtis Singleton Drilling Co. 2 R. L. Hollingsworth, Eli Mercer Sur., A-54, TD 4,160 ft., perf. 4,005-09 ft., IP: 18,000,000 cu. ft. of gas per day, open flow.

Live Oak County: Gas discovery—Howeth & Mason 1 Sanger Estate, GC&SF RR Sur., A-637, TD 2,716 ft., perf. 2,639-51 ft., IP: shut in, no gage.

Newton County: Oil discovery — Houston Oil Co. of Texas-American Republics Corp. B-2 Earl C. Hankamer, et al, HT&B RR Sur., Sec. 16, A-932, TD 7,343 ft., perf. 7,225-26 ft., IP: 183 bbl. oil per day, 9/64-in. choke, 37.7° gravity.

Orange County: Gas-condensate discovery—Union Producing Co. 1 Brown, I&GN RR Co. Sur., A-224, TD 8,300 ft., perf. 7,942-47 ft., IP: 100 bbl. condensate per day, ¼-in. choke, TP 2,870 psi.

Refugio County: New pay at Refugio—Sam E. Wilson, Jr., 1 Rogers Estate, James Powers Sur., A-50, TD 6,503 ft., perf. 4,750-55 ft., IP: 91 bbl. oil per day, 7/32-in. choke, 36.2° gravity.

Victoria County: New pay at McFaddin—The Chicago Corp. B-10 J. A. McFaddin, A. J. Gray Sur., TD 3,453 ft., perf. 2,224-45 ft., IP: 68,000,000 cu. ft. of gas per day, open flow.

Washington County: Wilcox oil discovery—Sinclair Oil & Gas Co. 1 Bess Henry, William Gates Sur., A-46, 10 mi. NE of Chapel Hill, TD 11,495 ft., perf. 9,214-18 ft., IP: 343 bbl. oil per day, ¼-in. choke, 43.8° gravity.

**TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES**

Brazoria County: E. Cockrell 6 F. A. Brock, et al, J. E. Groce 5 League, A-66, dry, TD 4,584 ft.

R. O. Mangum, et al, 1 Leslie Glase, HT&B Sec. 76, A-562, dry, TD 7,710 ft.

Colorado County: Wood Petroleum Co. 1 E. J. Gracey, P. H. Mayes, A-727, dry, TD 10,900 ft.

Fort Bend County: Carnes W. Weaver 1 Tom Kolja, H&TC RR Sec. 56, 11 mi. SE Rosenberg, dry, TD 7,918 ft.

Goliad County: Martin, Shelly & Thomas 1 L. W. Worsham, Maria J. de Leon Sur., A-22, dry, TD 3,825 ft.

Jackson County: Alcoa Mining Co. and Crown Central Petroleum Co. 205-2 State Lease 32043, Tract 205, Carancahua Bay, dry, TD 11,442 ft.

Jasper County: Brown & Wheeler-The Texas Co. 1 W. T. Reeves, C. W. Whitmore Sur., A-609, dry, TD 8,502 ft.

Owen Drilling Co. 1 Theodore Lamber, T. W. Scriviner Sur., A-652, dry, TD TD 8,320 ft.

Karnes County: Ryan, Hays & Burke 1 Ernst Hons, Don Erasmo Sequin Grant, 1 mi. S of Hobson, dry, TD 4,032 ft.

Live Oak County: Martin, Shelly & Thomas 1 Alamo Lumber Co., Josefa Giminez Sur. 27, A-185, dry, TD 1,510 ft.

Matagorda County: Gulf Oil Corp. 1 A. R. Freeman, flank of Hawkinsville dome, R. Sanborn Tract, dry, TD 6,522 ft.

Washington County: Western Natural Gas Co. 1 W. C. Bohne, A. Dillard Sur., A-39, dry, TD 10,018 ft.

Wharton County: Brazos Oil & Gas Co. 1 Rudolph Holub "A," ETRR Sur., A-116, Sec. 45, dry, TD 7,021 ft.

# South Louisiana

## Washington Parish Wildcat Tests Gas-Condensate Shows

NEW ORLEANS.—Apparently assured of gas-condensate production on basis of a drill-stem test, Humble Oil & Refining Co. is testing its C-1 Gaylord Container Corp., wildcat in 47-1s-14e, Washington Parish. Operator set 7-in. casing at total depth of 9,059 ft. and perforated from 9,017-25 ft.

Previously, the well was drill-stem tested at 8,999-9,004 ft. with recovery being 160 ft. of gas-cut mud and 30 ft. of condensate. Working pressure was recorded at 1,000 psi. and bottom-hole pressure 3,765 psi. This well is just across the state line from Mississippi, 2½ miles southeast of Sandy Hook field, Marion County, Mississippi, and it is a possible extension to that field.

Meanwhile, Humble is also testing its Lafourche Parish wildcat in the East Golden Meadow area. The well, 1 Louisiana Land & Exploration Co. "C," 30-19s-22e, is bottomed at 13,837 ft. with 7-in. production string cemented at 13,349 ft. Perforations have been effected of undisclosed interval.

Another wildcat preparing to test is William Herber Hunt 1 Powell Lumber Co., 36-6s-12w, Beauregard Parish. Hole is bottomed at 9,165 ft. with casing set on bottom. Operator is preparing to perforate and run production tests. The hole is plugged back to 8,394 ft.

Richardson & Bass and associates have staked location for a 15,500-ft. wildcat in Lafourche Parish, in the East Golden Meadow area of the parish. The well is designated 1-E Allen Land Co., 17-20s-23e, and contract has been awarded to Rowan Drilling Co.

A deep Plaquemines Parish wildcat has been abandoned at total depth of 13,025 ft.

The test is Ted Weiner 1 Louisiana Land & Exploration Co., 26-19s-27e, in the East Lake Washington area of the parish. Operator ran electric log to bottom with no consequential showings encountered.

**SOUTH LOUISIANA SUCCESSFUL WILDCAT**

Plaquemines Parish: Oil discovery — The California Co. 1 Louisiana State Lease 1784, in Bay Coquille, TD 11,200 ft., perf. 7,704-09 ft., IP: 168 bbl. oil per day, 8/64-in. choke, 28.° gravity.

**SOUTH LOUISIANA WILDCAT FAILURE**

Lafourche Parish: Richardson & Bass, et al, 1-K Lafourche Realty Co., 31-19s-23e, dry, TD 15,039 ft.

# Eastern Texas

## Grayson County Wildcat Reports Ellenburger Pay

DALLAS. — George Humphrey 1 Barnes Heirs, Grayson County wildcat 3 miles southwest of Hagerman and now just 3 miles from Sandusky field producers, reported a deeper pay possibility apparently in the Ellenburger.

The 1 Barnes test was the original Strawn sand discovery, but was drilled ahead on an 8,600-ft. contract and a second well was drilled in as the Strawn opener.

The 1 Barnes has shown for possible production in sands at 3,501-52 and 5,260-80 ft., and last test from 7,950-8,014 ft., open 1 hour and 15 minutes, developed 1,850 ft. of oil and gas-cut mud. On some reports it was credited with that amount of free oil. Drilling continued below 8,198 ft.

Meanwhile, Sinclair Oil & Gas Co. 1 Barnes, a north offset to the completed Strawn well and between it and the above test, had confirmation production in the Strawn. A drill-stem test open 30 minutes from 3,490-3,526 ft. had gas in 18 minutes and recovered 800 ft. of 35°-gravity oil, plus 400 ft. of oil-cut mud.

L. O. McMillan's second test in McMillan Oil Creek field, north of the Sandusky townsite, was running casing for completion attempt after topping Oil Creek at 8,219 ft. and drilling to 8,246 ft. Drill-stem tests, if any, were not reported.

Mid-Continent Petroleum Corp. and Skelly Oil Co. 1-D Chiles, wildcat in the Chiles Survey, was drilling limestone at 8,198 ft.

West of Sandusky, The Texas Co. 2 Barnes was drilling sand and shale at 6,593 ft.

Unconfirmed reports from a Cherokee County wildcat, northeast of Mount Selman and approximately 1 mile northeast of the North Jacksonville gas-distillate field, indicated a big gas-distillate well in the making.

The prospector is L. W. Dennis and Eugene Hunter 1 C. L. Newburn. Gas was encountered on a drill-stem test in Woodbine sand from 4,354-57 ft. Gas volume was variously estimated to 50,000,000 cu. ft. daily, with some distillate. At last report it had cored ahead to 4,371 ft. Although there is a dry hole between the 1 Newburn and the North Jacksonville field, it was said to be very similar to wells in that field.

**EAST TEXAS (DISTRICTS 5 AND 6) WILDCAT FAILURES**

Falls County: C. T. Rowland, Jr. 1 J. I. Cox, J. Hendershot Sur., 1½ mi. NE Durango, dry, TD 1,360 ft., Buda 1,087 ft., Georgetown 1,181 ft., Edwards 1,325 ft.

Hill County: James Thompson 1 Theo Taylor, S. H. Moore Sur., 2 mi. NW Mt. Calm, dry, TD 1,186 ft.

Navarro County: W. M. Rawles 1 M. C. Caston, F. Procello Sur., 10 mi. SE Corsicana, dry, TD 3,500 ft., Woodbine 3,176 ft.

Shelby County: Woodbine Oil Co. 1 J. J. Ashberry, G. Mitchell Sur., 6 mi. NE Center, dry, TD 3,381 ft.

Wood County: Jack L. Phillips 1 W. P. Jones, M. Polk Sur., 1½ mi. NE Pine Mills, dry, TD 5,650 ft., Pecan 3,010 ft., Austin 4,670 ft., Woodbine 5,190 ft.

# Kansas

## New Gove County Pool Gets Second Producer

CITIES SERVICE OIL CO. is completing its first confirmation well in the recently opened Gove pool, located southwest of the town of Gove, in Gove County, western Kansas. The new well is 2 Coberly, NW NW SE 15-14-29, a 40-acre location northwest of the discovery well. It pumped 247 bbl. of oil with 13 bbl. of water in 24 hours. Casing is perforated in the new pool's Marmaton pay zone at 4,304-11 ft. Total depth is 4,317 ft. The pool, the first for the county, is 28 miles from nearest production.

Confirmation also has been given the recently discovered Viola lime producing area located 4½ miles northeast of the Cunningham pool in Kingman County. Confirmation well is Lion Oil Co. 3 McMichael, NW SE SW 13-27-10w, a diagonal location northwest of the discovery well. Lion Oil Co. 2 McMichael. It established the maximum potential rating (3,000 bbl. per day). During an actual test it flowed 15 bbl. of oil in 5 hours. Total depth is 4,284 ft. with 5½-in. casing at 4,282 ft.

National Associated Petroleum Co. is opening another producing spot in the Huff-stutter area, Phillips County, in the extreme northern part of the state, where its 1 Stephens, NW NE NE 21-1-1E, swabbed 8 bbl. of oil per hour while testing its pros-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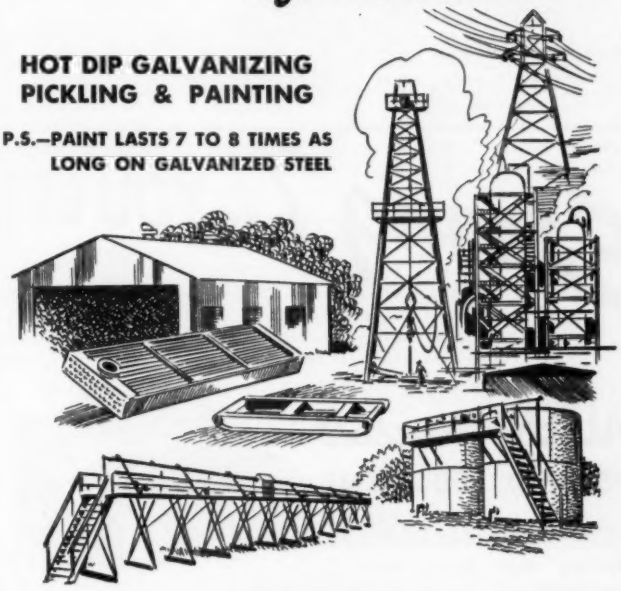

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pective Lansing-Kansas City pay zone. Casing, cemented on bottom of the hole at 3,482 ft., is perforated at 3,398-3,404 ft. and 3,382-87 ft. Pay zone received 2,000 gal. of acid.

Sohio Petroleum Co. has run casing to test oil and gas showings encountered in the Lansing-Kansas City section in its 1 Drews, NE SE NW 6-18-11, a wildcat located 4 miles southwest of the Kraft-Prusa pool, in Barton County. Hole was drilled to the Arbuckle, topped at 3,367 ft., but had no indications of commercial production below the Lansing-Kansas City, in which a drill-stem test at 3,076-3,102 ft. got a good showing of gas and recovered 300 ft. of heavily oil and gas-cut mud.

National Cooperative Refinery Association has a prospective Simpson sand discovery in northwestern Barber County, where its 1 Burbank, NE NE NW 4-30-14, recovered 310 ft. of gassy oil and 90 ft. of gassy and muddy oil in a drill-stem test at 4,571-76 ft. A test of the next 5-ft. interval showed salt water. Casing has been run through the zone to 4,672 ft. in Arbuckle lime, topped at 4,670 ft. Total depth is 4,675 ft. Top of the Simpson is 4,570 ft. (—2,604 ft.). Location is a mile southwest of the Shriver pool, Pratt County.

Opening of a new Mississippi lime pool is in prospect in southern Marion County where Aladdin Petroleum Corp. has run casing to test promising showings in its 1 Reigle, NE NE SW 12-22-3e. Top of the Mississippian is 2,432 ft. A 30-minute drill-stem test at 2,454-83 ft. yielded 50 ft. of oil and 250 ft. of heavily oil-cut mud. Hole was drilled to 2,936 ft. in Arbuckle lime without further important shows. Casing is at 2,570 ft. and will be perforated opposite the Mississippian.

**Iowa.**—In Harrison County, 4-5 miles east of the Missouri River boundary of Burt County, Nebraska, Hall 1 Johnson, wildcat in SE SE NE 18-81n-44w, is below 300 ft. On an elevation of 1,055 ft., the test found Pennsylvanian lime at 133 ft. with asphaltic oil shows and gas bubbles.

**KANSAS SUCCESSFUL WILDCATS**

Butler County: Holcomb et al 1 Price, SW SW SE 16-29s-6e, 25 bbl. oil from Kansas City at 2,060-72 ft., TD.

Cowley County: Keener & High 1 Brown, CWL W/2 NW 14-31s-7e, 2,000,000 cu. ft. gas from Stalnaker at 1,550-1,600 ft., TD 3,108 ft., Bartlesville 2,645 ft., Mississippi lime 2,735 ft.

Meade County: Columbian Fuel et al 1 Adams, SW NE NW 25-34s-30w, 3,000 bbl. 41°-gravity oil from Marmaton at 5,346-50 ft., TD 6,324 ft., Lansing-Kansas City 4,485 ft.

Rice County: Jackson 1 Sims, NW SE SE 32-18s-6w, pumped 2 bbl. oil from Lansing at 2,995-3,005 ft. and 3,142-45 ft., TD; anhydrite 935 ft.

Rooks County: Francis Oil & Gas 1 Anderson, SW SW SW 9-7s-19w, pumped 28 bbl. oil from Arbuckle at 3,398-3,409 ft., TD; anhydrite 1,440 ft., Heebner 3,086 ft., Toronto 3,112 ft., Lansing-Kansas City 3,130 ft., Sooy 3,386 ft.

Saline County: Sheldon 1 Bengston, SW NW SE 36-15s-4w, pumped 208 bbl. oil from Maquoketa dolomite at 3,423-27 ft., TD; Mississippi lime 2,904 ft., Kinderhook 3,190 ft., Misener 3,334 ft., Hunton 3,336 ft., Maquoketa shale 3,347 ft.

Sumner County: Petroleum Trading & Transport et al 1 Zoglemann, NE SE SW 8-31s-1w, pumped 86 bbl. 46°-gravity oil from Simpson at 4,034-38 ft. and 4,058-60 ft., TD; Topeka 1,998 ft., Stalnaker 2,742 ft., Kansas City 3,224 ft., Marmaton 3,359 ft., Cherokee 3,484 ft., Mississippi lime 3,668 ft., Kinderhook 3,985 ft.

**KANSAS WILDCAT FAILURES**

Barton County: Adair 1 Wirth, SE NE NE 4-18s-12w, dry, TD 3,359 ft.

Butler County: Ingling 1 Zuercher, SW SW NE 30-23s-3e, dry, TD 3,139 ft.

Richland 1 Price, SW NW NE 20-29s-6e, dry, TD 2,824 ft.

Clay County: Dieter 1 Lippert, CWL NE NE 28-6s-4e, dry, TD 2,829 ft.

Decatur County: Herndon 1 Bader, NW NW SW 20-5s-26w, dry, TD 4,255 ft.

Dickinson County: Continental 1 Reese, NE NW SW 6-14s-2e, dry, TD 3,187 ft., strat test.

Ellis County: Rine 1 Crissman, NW NW NE 34-12s-18w, dry, TD 2,820 ft.

Ford County: Clay 1 Birney, SW NE SW 35-27s-21w, dry, TD 5,015 ft.

Graham County: Gore 1 Law, SE SE SE 27-9s-23w, dry, TD 4,240 ft.

Hodgeman County: Flynn 1 Osborne, SE SE SW 14-23s-22w, dry, TD 4,560 ft.

Miners 1 Resen, SW SW NE 24-23s-24w, dry, TD 4,810 ft.

Kingman County: Laura Jane et al 1 Johnson, SE SE SE 33-27s-5w, dry, TD 3,803 ft.

Marshall County: Groge et al 1 Suggett, NW SW NW 34-2s-8e, dry, TD 2,373 ft.

Norton County: Peel-Hardman 1 Allen, SW SW SW 11-5s-24w, dry, TD 3,835 ft.

Osage County: Woods 1 Oberle, SW SW NW 14-14s-15e, dry, TD 2,530 ft.

Reno County: Wakefield 1 Goering, SE SE SE 14-25s-6w, dry, TD 4,032 ft.

Rice County: Derby et al 1 Davis, SW SW NW 12-18s-9w, dry, TD 3,335 ft.

Mallard 1 Wiggins, SW SW NW 7-19s-7w, dry, TD 3,317 ft.

Rooks County: Musgrove 1 Veverka, NW NW SW 23-8s-19w, dry, TD 3,458 ft.

Russell County: Taxman 1 Woelk, SW SW NW 35-12s-14w, dry, TD 2,820 ft.

Blair 2 Hilderbrandt "A," SW SW SW 12-14s-14w, dry, TD 3,291 ft.

Saline County: Melland 1 Carlson, SW NW NW 34-15s-4w, dry, TD 3,798 ft.

Sedgwick County: Dunne & Strait 1 Larimer, SW SW SW 16-29s-2e, dry, TD 3,620 ft.

Trego County: Peel-Hardman 1 King, NE NE SE 2-13s-22w, dry, TD 4,177 ft.


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# Mississippi

## Franklin County Prospect Swabs Oil From Wilcox

JACKSON.—Approximately 5 miles south and slightly west of the town of Roxie, Franklin County, Dave Gammil-Lyle Cashion Co. have set production casing to 6,340 ft. in 1 D. F. Anderson, prospective Wilcox discovery. This wildcat logged shows of oil in shaly sand at 6,260-65 ft., and in porous sand at 6,265-70 ft. with salt water immediately below this. Operators perforated casing at 6,260-64 ft., and the well started to flow a small amount of wash water and oil. When the rate of flow reached only 1 bbl. per hour, operators started swabbing. It is reported that operators will either install pump and complete from present perforations or will perforate 1 ft. deeper which would open up the top foot of the porous sand section. The latter procedure would increase the hazard of salt water encroachment.

At the newly discovered Glazier salt dome, Perry County, Union Producing Co. A-1 B. M. Stevens, 19-4n-9w, has reached a total depth of 8,102 ft. in salt, and operator is running velocity surveys in an attempt to map the outline of this deep-seated salt dome. This wildcat encountered approximately 30 net feet of thin sand stringers saturated with heavy black oil in the upper Tuscaloosa before entering Cap Rock at 7,476 ft. First salt was encountered at 7,685 ft. Operators plan to perforate casing and test the oil shows as soon as the velocity surveys are completed.

Hancock County, in extreme southern Mississippi, has received a new wildcat. Sun Oil Co. will drill 1 Weston Lumber Co., C NW SW 20-2s-8w, to 8,500 ft. This is in a relatively untested area, and it is not definitely known just what formations the well will penetrate. Closest previous test was drilled by Gulf Refining Co. at its 1 R. J. Williams Land Co., 11-8s-15w, approximately 7 miles northwest of the new location. The well was drilled to 4,251 ft. in

Heterostegina with no shows being encountered.

**MISSISSIPPI WILDCAT FAILURES**

Adams County: George M. Harrison 1 George Armstrong, 16-5n-2w, dry, TD 7,011 ft.

Forrest County: The California Co. 1 C. E. Berry, 8-4n-12w, dry, TD 6,028 ft.

Itawamba County: Walter E. Sistrunk 1 Barry Wheeler, 9-11s-9e, dry, TD 990 ft.

Wayne County: Gulf Refining Co. 1 Mary McPherson, et al, 29-9n-5w, dry, TD 6,803 ft.

**ALABAMA WILDCAT FAILURE**

Washington County: Justiss-Mears 1 Florence Gorham, 32-5n-4w, dry, TD 8,016 ft.

## North Central Texas

### Sinclair Finals Fisher County Test in Strawn

WICHITA FALLS.—Sinclair Oil & Gas Co. has completed 1 Belle Hunsaker, northeast of Rotan in Fisher County, as a Strawn discovery. Potential was 283.4 bbl. of 40°-gravity oil a day, flowing through ¼-in. choke from perforations at 5,710-20 ft. The well had been drilled to 6,705 ft.

Lion Oil Co. 2 R. Allen, in the unnamed new area 3 miles southeast of Roby, flowed 147 bbl. of oil in 7 hours and continued testing. Total depth was 3,626 ft.

Taylor County gained a deep wildcat as Humble Oil & Refining Co. 1 J. I. Cartwright, located 3 miles northwest of Bradshaw in the T. D. Maltby Survey 270. Contractor was moving in rig for a 5,300-ft. test.

Magnolia Petroleum Co. had a possible Strawn sand discovery at its 1 Emma Jackson, Callahan County wildcat 5 miles north of Baird. The well was started as a 4,800-ft. Ellenburger exploration.

On drill-stem test from 2,699-2,705 ft., open 45 minutes, oil reached the surface in 18 minutes, cleaned into pits for about 10 minutes, then gaged 18 bbl. of oil in as many minutes. Recovery in the pipe was 630 ft. of oil, 120 ft. of salt water and 5 ft. of mud. A second test from 2,707-14 ft. had gas in 46 minutes but recovered no fluid, and drilling was resumed.

Mid-Continent Petroleum Corp. has staked location for another Callahan County wildcat, 6 miles east of Abilene, as the 2 Stevenson and projected to 5,000 ft. Location is a north offset to its 1 Stevenson, originally planned to 5,000 ft., but last reported setting casing for completion after flowing oil on a drill-stem test at 3,264-78 ft. The amount of flow and producing zone were not disclosed.

A good Ellenburger producer was finaled by Bert Fields at his 1 Ace Hickman, 3 miles northwest of Sedwick. On completion test the well flowed 433 bbl. of 45°-gravity oil a day through ¼-in. choke. Flowing tubing pressure was 545 psi. Pay was between 4,256-63 ft., total depth. Location is in the new Rattlesnake Mountain field.

**NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS**

Archer County: Transcontinental Oil Co. 1 V. Hemmi, 61-3-Clark & Plumb, TD 5,233 ft., elev. 1,010 ft., perf. Caddo 5,139-49 ft., flowed 200 bbl. 41°-gravity oil.

Jack County: Larson & Thomas 1 W. J. Eatherly, W. B. Stramer Sur., 3½ mi. W Jacksboro, TD 4,966 ft., Caddo 4,461 ft., pumped 166 bbl. 40°-gravity oil.

Stonewall County: Cities Service Oil Co. 1-140 Flat Top, Sec. 140, BBB&C Sur., 8 mi. NW Hamlin, TD 3,405 ft., Swastika 3,362 ft., flowed 330 bbl. oil, 16/64-in. choke, GOR 407 cu. ft.

Wichita County: Panhandle Producing & Refining Corp. 2-A Smith and Carrigan, Day Land & Cattle Co. Sur., 4 mi. E Kamay, TD 688 ft., pumped 10 bbl. 39°-gravity oil.

Young County: W. F. Newton 1 Bennie


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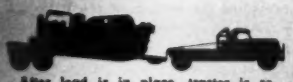

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Hilbers, Blk. 50, TE&L Sur., 1½ mi. NW Orth, TD 4,901 ft., Mississippian pay 4,864 ft., flowed 134 bbl. 44°-gravity oil, ¼-in. choke, TP 400 psi., GOR 550 cu. ft.

Reno Oil Co. 1 B. L. Fain, Cantwell Sur., 4 mi. E Farmer, TD 5,310 ft., PB 643 ft., pumped 6 bbl. 39°-gravity oil.

**NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES**

Baylor County: Rycade Oil Corp. 1 J. H. Jenkins, R. J. Scott Sur., dry, TD 5,800 ft.

Brown County: McLean-Roberts 1-B Cox & McInnis, Sec. 26, Osborne Dalton Sur., dry, TD 1,350 ft., Caddo 1,328 ft.

Callahan County: Horace E. White 1 N. I. Williams, Sec. 46, LAL Sur., dry, TD 4,252 ft., elev. 1,429 ft., Barnett 4,124 ft., Ellenburger 4,172 ft.

Clay County: Bridwell Oil Co. 9-C Saner, J. Massie Sur., dry, TD 1,500 ft.
L. T. Burns 1 L. Taylor, W. A. Farris Sur., dry, TD 4,600 ft.

Hull Oil Co. 3 Allen Rodgers, McGowan & Young Sur., dry, TD 1,060 ft.
Hull Oil 4 Rodgers, McGowan & Young Sur., dry, TD 1,200 ft.

Coleman County: Anderson, Word & Jones 1 Stevens, Sec. 22, H. Warfield Sur., dry, TD 3,825 ft., Capps 3,492 ft., Garner 3,790 ft.
Anzac Oil Corp. 1 C. B. Rendleman, Sec. 275, M. Hunt Sur., dry, TD 1,905 ft.
Blevins & Bigan 1 W. P. McClotchey, McKinney & Williams Sur., dry, TD 902 ft.
Luling Oil & Gas Co. 2 W. H. Davis, Sec. 11, T&NO Sur., dry, TD 3,601 ft., Jennings sand 3,402-09 ft.
Mid-Continent Petroleum Corp. 1-B Davenport, 128-1-GH&H, dry, TD 3,554 ft., Ranger 2,358 ft., Fry 2,980 ft., Gardner 3,104 ft.

Cooke County: D. H. Bolin 1 L. M. Almon, I. Kuykendall Sur., dry, TD 3,003 ft., Ellenburger 2,835-75 ft.
Clark & Cowden Drilling Co. 1 R. S. and F. W. Gruber, T. Garson Sur., dry, TD 1,880 ft.
Kay Kimball and A. D. Britton 1 H. A. Davis, E. Irwin Sur., dry, TD 7,010 ft.
Frank Wood 1 Pace Bros., BBB&C Sur., A-152, dry, TD 4,300 ft.

Eastland County: McElroy Ranch Co. 1 M. V. Dyer, Sec. 2,053, TE&L Sur., dry, TD 3,710 ft.
Oil Associates, Inc. 1 Schoor, 50-3-H&TC, dry, TD 3,770 ft., Strawn 1,640 ft., Caddo 2,852 ft., Mississippian 3,695 ft., Ellenburger 3,750 ft.
Bob Sunshine 1 Allen, T. Harwell Sur., dry, TD 1,110 ft.
Trumter Petroleum Corp. 1 Schilling-Hawkinson, Sec. 17, ETRR Sur., dry, TD 1,928 ft.

Jack County: Jack Grace Production Co. 5 L. L. Campsey, J. J. Ward Sur., dry, TD 5,586 ft., conglomerate 5,470 ft.
Helmerich & Payne, Inc. 1 Bailey, W. L. Thomas Sur., dry, TD 5,411 ft.
S. D. Johnson 2 J. R. Clayton, Blk. 3,322, TE&L Sur., dry, TD 4,947 ft.

Jones County: Sojourner Drilling Co. 1 F. W. Poe, Sec. 12, Blk. 335, L. Kratz Sur., dry, TD 3,581 ft., Flippen 2,750 ft., Hope 2,915 ft.

Knox County: Continental Oil Co. 1 B. B. Campbell, 1-A93-HT&B, dry, TD 6,138 ft., elev. 1,458 ft., Caddo 5,539 ft., dolomite 6,054 ft.
Rowan & Hope 1 T. P. Clonts, D. G. Burnett Sur. 6, dry, TD 6,350 ft., Mississippian 5,800 ft.

Montague County: Ted A. Norwood 1 Moore, 73-A407-Kaufman CSL, TD 3,050 ft.

Shackelford County: Big West Drilling Co. 1 J. H. Nail 23, Sec. 149, ETRR Sur., dry, TD 1,665 ft.
Big West 2 J. H. Nail 3, Sec. 18, ETRR Sur., dry, TD 1,111 ft.

Stonewall County: Oxford Drilling Co. 3 J. W. Hines, 171-1-BBB&C, dry, TD 2,709 ft.

Taylor County: Lester & Duffield, Inc. et al 1 W. E. Morton, D. T. Bruce Heirs Sur. 135, dry, TD 4,926 ft., Swastika 2,780 ft., Capps 4,090 ft., Caddo 4,825 ft.
Round Top Oil Co. 1 J. C. Landers, 1-20-Guadalupe CSL, dry, TD 5,138 ft., Flippen 2,295 ft, reef 2,890 ft., Ellenburger 5,085 ft.

Wichita County: Frank Wood 1 Augusta Ramming, 3-A342-GS&F, dry, TD 1,578 ft.

Wilbarger County: Wilder & Underwood 1-D Waggoner, dry, TD 2,460 ft.
Frank Wood 1 W. T. Waggoner "OO," 26-6-H&TC, dry, TD 2,164 ft.

Young County: Perkins Bros. 1 Leberman-City of Olney, TE&L Sur. 154, dry, TD 5,236 ft., Caddo 4,211 ft., Ellenburger 5,190 ft.
Sid Perryman et al 1 D. L. Keith, Blk. 28, TE&L Sur., dry, TD 737 ft.


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## Oklahoma

### Second Well Confirms Tussey Sand Discovery

DISCOVERY last month of what appeared to be exceptionally good Tussey sand production off the south flank of the Velma pool in Stephens County, southern Oklahoma, has been confirmed by completion of the second well, a diagonal northwest offset to the discovery producer.

It is Van Grisso Oil Co., Kerr-McGee Oil Industries, Inc., and associates 1 Everet Willeford, NE SE NW 13-2s-5w. During production tests the well flowed 122 bbl. of oil in 24 hours through ½-in. choke, and 80 bbl. in 24 hours through ¼-in. choke. Tussey sand is exposed through casing perforations at 2,017-22 ft., 2,027-49 ft., and 2,107-15 ft. Total depth is 2,516 ft. with casing at 2,320 ft. The same operators drilled the discovery well, which, with casing perforated at 2,056-90 ft., flowed 105 bbl. of oil in 13 hours in tests through open tubing.

South of production of the southeast ex-

tension area of the Velma pool and several miles to the east of the Van Grisso Tussey sand development, Continental Oil Co. has another prospective discovery well, both in the Tussey section and the slightly shallower Eason sand, in its 1 Adams-Von Weise, NW SW NW 15-2s-4w. The location is about 2 miles south of the town of Alma, which is in the heart of the active southeast extension area. The well has oil-string run through both zones to 4,181 ft. preparatory to testing after being drilled to 6,832 ft. Approximately 60 ft. of oil and 90 ft. of oil-cut mud was recovered in a drill-stem test of the Tussey zone at 3,686-3,720 ft. A previous drill-stem test in the Eason sand at 3,577-3,627 ft. yielded 6 ft. of oil and 47 ft. of heavily oil-cut mud. The well cut the top of the Springer section at 4,232 ft.

The Doyle field, also in Stephens County, is getting an exceptionally good producer at Murphy Oil Co. 6 Payne, NW SW SE 2-1n-5w, which flowed 300 bbl. of oil in 2 hours through ½-in. choke. Production is from a sand phase of the Oolitic (basal Hoxbar) section opposite which casing is perforated at 5,700-5,845 ft. Total depth 5,980 ft. with casing on bottom. Active development of this pay zone began during the past year with six companies now participating.

Cities Service Oil Co. has encountered promising oil and gas showings in Arbuckle lime at its 2 Lane in the old Deer Creek field in Grant County, northern Oklahoma. Production in the field is mainly from Wilcox sand, opened in October 1927, and found around 4,000 ft. A drill-stem test of the Arbuckle at 4,231-56 ft. in the Cities Service well had gas at the top within 8 minutes after the tester was opened and yielded 900 ft. of gas-cut oil and 180 ft. of oil-cut mud in the breakdown. Tester was open 80 minutes.

Location has been made for another deep test in Roger Mills County, in the extreme western part of the state. The test, projected to 13,500 ft., will be a joint venture of Gulf Oil Corp. and Sinclair Oil & Gas Co. and will be drilled as 1 Vera Sprowls. Location is in the south central part of the county, 2 miles south of Cheyenne, the county seat. It is about 18 miles northwest of the Elk City field, and about 4 miles northwest of another deep test, 1 Taylor, C SE NE 14-12n-23w, being drilled by Gulf, and now down below 8,300 ft.

**OKLAHOMA SUCCESSFUL WILDCATS**

Garfield County: H. C. Bundy et al 1 Hodges, SW SW NW 3-21n-2w, flowed 150 bbl. 43°-gravity oil from Crews sand at 2,164-82 ft., TD 2,221 ft.

Stephens County: W. L. Wolfe et al 1 Tucker, NE SE SE 18-3s-4w, flowed 5,000,000 cu. ft. gas from sand at 560-70 ft., TD 1,682 ft., Loco sand 862-76 ft., Healdton sand 1,636-47 ft., sand 1,664-1,682 ft.

**OKLAHOMA WILDCAT FAILURES**

Beckham County: Whitaker et al 1-A Hawkins, NE NE NE 25-9n-23w, dry, TD 3,050 ft.

Bryan County: Pure Oil 1 "Strat," SE SW SW 16-7s-9e, dry, TD not released.

Pure Oil 2 "Strat," SE SE NW 19-7s-10e, dry, TD not released.

Cleveland County: Ashland Oil & Refining et al 1 Owens, C NE SE 23-7n-1w, dry, TD 7,244 ft.

Lincoln County: Thompson & Harris et al 1 Kalka, SE SW SE 13-13n-5e, dry, TD 3,218 ft.

Logan County: Eugene & Julie Jordan 1 Beland, SW SW NW 6-15n-1e, dry, TD 5,876 ft.

Okfuskee County: Waggoner 1 Walker, SE SE SE 19-13n-7e, dry, TD 4,173 ft.

Pawnee County: Mid-Continent 1 Morgan, NE SW SW 19-20n-6e, dry, TD 2,253 ft.

Payne County: Derby Oil 1 Pershing, SE SE NW -9-18n-1e, dry, TD 4,915 ft.

Harper-Turner et al 1 White, NE NE SE 14-20n-4e, dry, TD 4,024 ft.

Woodward County: Wegener et al 1 Ferguson heirs, C NE SE 10-23n-21w, dry, TD 8,920 ft., base Blaine 350 ft., salt 1,220 ft., Wellington 1,920 ft., Enid anhydrite 2,190 ft., base anhydrite 3,010 ft., base Hollingburg 3,055 ft., Herrington 3,065 ft., Krider 3,122 ft., Winfield 3,183 ft., Ft. Riley 3,314 ft., base Wreford 3,590 ft., base Cottonwood 3,800 ft., Neva 3,860 ft., Four Acre 3,960 ft., Brownville 4,260 ft., lower Lovell lime 5,580 ft., Tonkawa 5,957 ft., Checkerboard 6,580 ft., Big lime 6,640 ft., Oswego 6,790 ft., Cherokee 6,945 ft., Verdigris 7,010 ft., Inola 7,270 (?) ft., Morrow sand 7,738-75 ft., Chester 7,814 ft., Mississippi lime 8,792 ft.

## Southwest Texas

### Val Verde County Wildcat Tests 35,000 M.c.f. Open Flow

CORPUS CHRISTI. — Val Verde County's important Strawn lime discovery, R. J. Caraway 1 Mrs. Guida Rose, GC&SF Survey 2, has been potentialed for 35,000,000 cu. ft. of gas per day on open flow. Perforations were effected at 10,050-55 ft., 10,069-74 ft., and 10,085-10,100 ft. in the Strawn. The section was acidized with 2,000 gal. of acid for completion. Top of the Strawn lime was logged at 9,899 ft., Bend lime 10,768 ft., Mississippian 10,865 ft., Simpson 11,153 ft. and Ellenburger lime 11,301 ft. This well is in rank wildcat territory and has set off a drilling surge for the area.

C. C. Dauchy and Miller Royalty Co. 1 Jane Burns, new Navarro-zone oil discovery on the Atascosa-Frio county line, has been gaged for 34.7 bbl. of 40°-gravity oil daily on pump. Production is from open hole at 3,550-67 ft. The well is located in Francis Oerelling Survey 1336, Abstract 654, approximately 10 miles northwest of Charlotte.

On the east flank of Dilworth salt dome, McMullen County, H. R. Smith, et al, 1 C. Martin Estate, deep pay discovery, flowed oil through perforations at 8,380-96 ft. and then died. Operator acidized with 10,000 gal., and the well flowed 1½ bbl. of fluid


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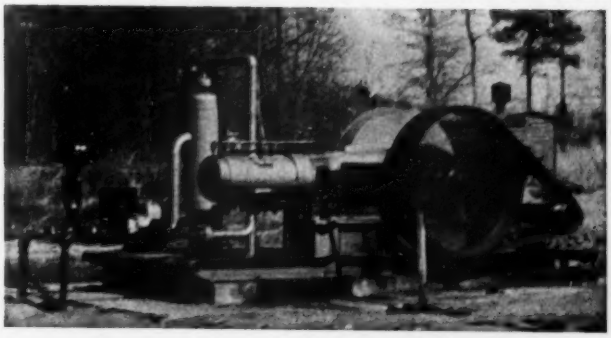

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per hour, 75 per cent oil and 25 per cent acid water. The well was swabbed and is flowing by heads.

In the same county, completion of Sunray Oil Corp. 1 A. M. Hostetter, prospective Wilcox discovery, has been delayed because of a tubing leak. The wildcat flowed a large amount of gas and condensate on initial-production test at 10,088-10,114 ft. Bottom-hole pressure was 7,700 psi. Operators will repair the leak before further testing. The well is located in Justo Corona Survey 68, Abstract 1122. Hole is bottomed at 10,244 ft. with 5-in. liner set on bottom.

The Texas Co. 1 Yturria Land & Livestock Co., wildcat in Porcion 44, Hidalgo County, recovered gas and distillate-cut water and 1 bbl. of brown-colored distillate on drill-stem test at 5,868-77 ft. Hole is bottomed at 5,895 ft.

**SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCATS**

Hidalgo County: Gas discovery—The Texas Co. 1 Pate Gas Unit, Antonio Guiterrez Sur., Porcion 63, TD 8,000 ft., perf. 6,253-63 ft., IP: 7,000,000 cu. ft. of gas per day, open flow.

San Patricio County: Gas discovery, "Patrick"—LaGloria Corp. 1 Mary Lou Patrick, Sec. 18, Lot 42, 3rd Addn. of Taft Farm Lands, 2 mi. SE of E. Taft field, TD 6,513 ft., perf. 5,916-27 ft., IP: 16,000,000 cu. ft. of gas per day, open flow.

Starr County: Gas discovery—C. G. Glasscock and Shelby Walker Corp. 1 Yturria Land & Livestock Co., Porcion 43, TD 9,505 ft., open hole 5,895-5,905 ft., IP: 14,500,000 cu. ft. of gas per day, open flow.

Val Verde County: Gas discovery—R. J. Caraway 1 Mrs. Guida Rose, NE¼ of Sec. 2, GC&SF Sur., TD 11,500 ft., Strawn lime 10,050-55 ft., 10,085-10,100 ft., and 10,069-75 ft., IP: 35,000,000 cu. ft. of gas per day open flow, SIP 5,628 psi.

**SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES**

Atascosa County: F. William Carr 1 Bryan Campbell, et al, William M. Smith Sur. 200, A-803, dry, TD 2,862 ft.

R. L. Lynd 1 J. L. Dornak, Geo. Hagelstein's Farm Tracts Subd., John Gaston Sur., Bdry, TD 1,420 ft.

Southern Minerals Corp. 1 Mattie Corbitt, McMullen & McGloin Sur. 133, A-549, dry, TD 6,085 ft.

Caldwell County: Riddle Oil Co. 3 Miears, Nich Kelly Sur., dry, TD 2,518 ft.

Duval County: F. P. Zoch, Jr., 1 Leroy Denman, Block 3, Sec. 61, La Copita Farm and Gardens Tract, dry, TD 6,311 ft.

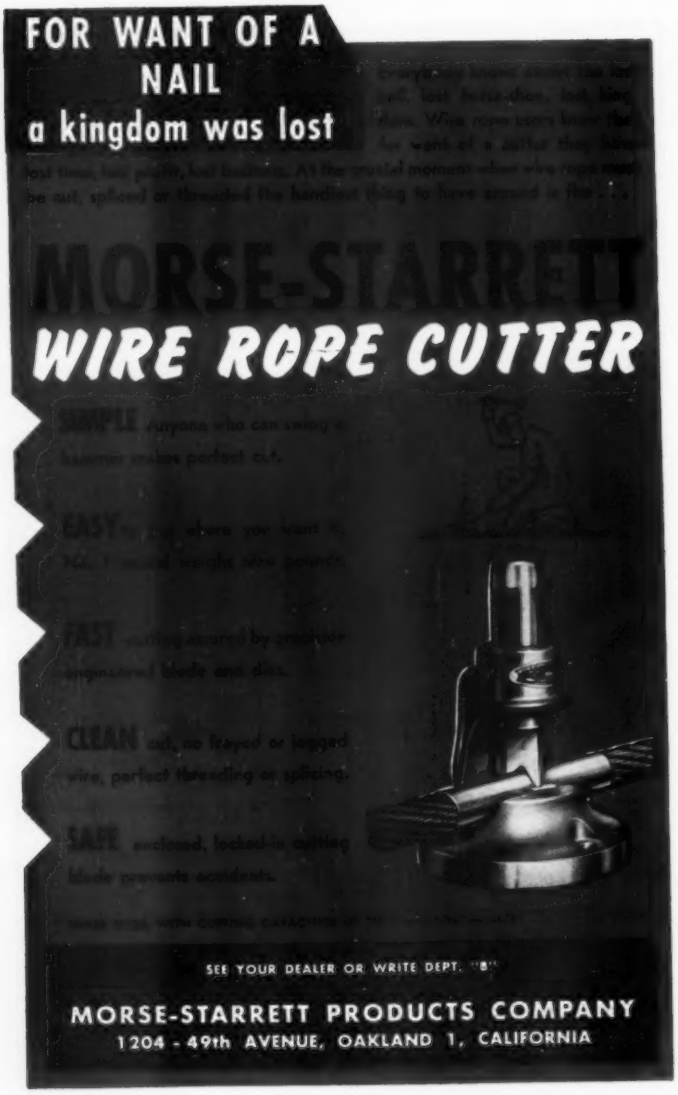
Jim Hogg County: Sun Oil Co. 30 A. C. Jones, Agua Nueva de Abajo Grant, dry, TD 4,400 ft.

Kendall County: Kendalia Co., Inc., 1 Arnold Marquart, Traviso Sur., dry, TD 960 ft.

McMullen County: V. G. Schimmel 1 Gus A. Lowrance, S. N. Steinhardt Sur. 58, A-731, dry, TD 2,072 ft.

Val Verde County: Husky Oil Co. 1 Rose-Robertson, Sec. 83, Blk. N, GH&SA RR Co. Sur. A-848, dry, TD 2,408 ft.

Webb County: Panhandle Producing & Refining Co. 1 Puig, Black 30, Edgington Subd. of Las Albercas Grant, dry, TD 3,312 ft.



## Michigan

### Possible Traverse Discovery Testing in Newaygo County

MOUNT PLEASANT.—A possible new Traverse oil discovery well was under test this week at Augie Busk 1 Hatchew et al, SE SW NW 29-12n-11w, Croton Township, Newaygo County. Wildcat logged Traverse lime at 2,548 ft., and an oil-water pay was drilled from 2,551-52½ ft., present total depth. Hole carried 650 ft. of free oil and no water, natural, in 4 hours. The showing was acidized with 1,000 gal., and water started to show.

After acidizing fluids had been recovered by swabbing, the well started flowing 36 bbl. of fluid in 35 minutes, about 50 per cent oil. Pumping rods were run, and agitation with the drilling engine was started. After well had been shut down for 9 hours for engine repairs, it pumped and flowed 80 bbl. of fluid in 6 hours, 45 bbl. of oil and 35 bbl. of water.

It was reported that operator was of the opinion that on a steady-production basis the water cut would be reduced to not more than 20 per cent of the total fluid produced. During the last 12 hours of production time, before drilling machine was torn down and pumping-unit installation was started, well pumped and flowed 38 bbl. of oil and 30 bbl. of salt water. An estimated 2,000,000-cu. ft. gas head was reported showing with the oil-water production.

The Croton Township area was originally set up for oil exploration by a Sun Oil Co. core-drill program. Sun drilled a Traverse test out dry, ½ mile to the north of Busk's well in October 1949. Busk followed this Sun failure to the north which set up the current play. Busk and associates and Sun Oil Co. are the major acreage holders in this potential new Newaygo County area. No new starts as yet had been announced for the area.

**MICHIGAN SUCCESSFUL WILDCAT**

Montcalm County, Pine Township: The Moco 1 Allen, SW NE SE 9-11n-8w, Stray 1,247 ft., 2,110,000 cu. ft. of gas gaged, TD 1,253 ft.

**MICHIGAN WILDCAT FAILURES**

Allegan County, Ganges Township: Ford

Oil Co. 1 Beacher, NW NE SW 20-2n-16w, Traverse 1,243 ft., dry, TD 1,246 ft.
Heath Township: Irvele Harrington 1 Tucker, SE SW NW 16-3n-14w, Traverse 1,457 ft., dry, TD 1,458 ft.
Hopkins Township: Max Spidel 1 Mayer, SW NE NW 34-3n-12w, dry in Coldwater series, TD 500 ft.

Isabella County, Deerfield Township: Merrill Drilling Co. 1 Bellinger, SE SE SE 31-14n-5w, Dundee 3,688 ft., dry, TD 3,710 ft.

Kent County, Byron Township: P. K. Degenther 1 DeBraaf, NW SW NW 16-5n-12w, Traverse 1,772 ft., dry, TD 1,785 ft.
Sparta Township: P. K. Degenther 1 Saur, Bonter Comm., SW NW NE 8-9n-12w, Traverse 2,306 ft., dry, TD 2,356 ft.

Monroe County, Summerfield Township: Vernon H. Rowe 1 Bieber, SW NW SW 18-7s-6e, Trenton 1,938 ft., dry, TD 2,008 ft.

Montcalm County, Evergreen Township: Ohio Oil Co. 1 Loree, SW SW NW 11-10n-6w, Dundee 3,277 ft., dry, TD 3,476 ft.

Muskegon County, Cedar Creek Township: Charles D. Hoffman 1 Stanley-Nylander Comm., SE SE SW 18-11n-15w, Traverse 1,847 ft., dry, TD 1,872 ft.
Norton Township: E. L. Bourrett 1 Sanders, SE SE NW 33-9n-16w, dry in Coldwater series, TD 970 ft.

## Appalachian-Ohio

### Oriskany Gas Found In Elk Dilstrict Well

PITTSBURGH.—In Elk district, Kanawha County, West Virginia, United Fuel Gas Co. 6-X-52A-7103 Ego Gallati, resulted in 2,363,000 cu. ft. of gas in the Oriskany sand with total depth at 5,644 ft. Current operations include: Williamsburg district, Greenbrier County, Deep Rock Oil Corp. 1 Bertha Thornburry et al, elevation 2,420 ft., drilling at 1,577 ft.; Portland district, Preston County, Hope Natural Gas Co. 9637 Margaret Krause, elevation 2,247 ft., running casing at 4,976 ft.; Logan district, Logan County, Hope Natural Gas 9649 Boone County Coal Corp., drilling at 1,305 ft.; Slate district, Wood County, Glen Roberts 1 M. W. Farrell drilling at 4,696 ft. after topping the Corniferous lime at 4,869 ft.

**Pennsylvania.**—In the southwest, Unity Township, Westmoreland County, Peoples Natural Gas Co. 1-3921 Fred Musnug, elevation 2,100 ft., is drilling at 8,299 ft., having encountered no further gas. In Napier Township, Bedford County, South Penn et al-Snee & Eberly 1 Jesse Miller is fishing at 8,878 ft.

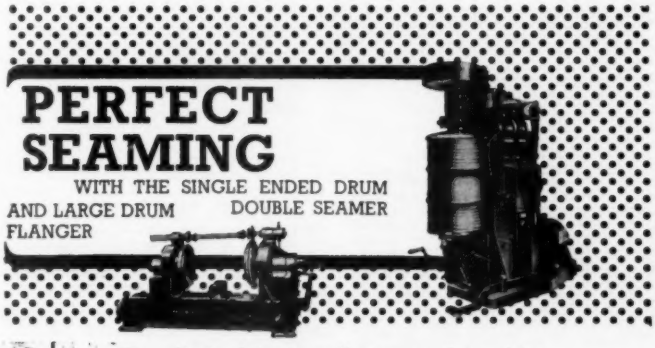
In the north central section of the state, Leidy Township, Clinton County, Shaw & Smith got salt water in the Oriskany at 1 Pat Foley, stepout location on the southeast side of the field. The Onondaga was topped at 7,019 ft., the Oriskany at 7,040 ft., and total depth is 7,044 ft. Fraelich et al completed 1 Pennsylvania Tract 5 at total depth of 5,970 ft. for 1,600,000 cu. ft. of gas. Keta Oil & Gas Co. finished its 1 Carlson at 5,919 ft. for 1,200,000 cu. ft. of gas from the Oriskany which was topped at 5,906 ft.

Work has started at two new ventures in northern Pennsylvania: Shearer et al 1 Jake Horsch, Section B, Tamarack Quadrangle, Leidy Township, Clinton County; Dorsey Calhoun et al 1 Frank Sykora, Section H, Galeton Quadrangle, Abbott Township, Potter County.

**Maryland.**—Drilling continues steady in Garrett County; one gas test and one dry wildcat were completed the past week (see completion paragraphs following). New York State Natural Gas Corp. 1-N-230 C. P. Martin is shut down at 3,823 ft. and will be acidized.

**MARYLAND SUCCESSFUL WILDCAT**

Garrett County: Columbian Carbon Co. 1-



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**MARYLAND WILDCAT FAILURE**

Garrett County: Union Drilling Co. 1 Simon Cogley, dry, TD 5,531 ft.

**OHIO**

COLUMBUS.—Mid East Oil Co. completed an oil well 1½ miles south of the old gas pool in Tiverton Township, Coshocton County, that indicates the opening of a new pool. On 1 Gustaff Kirch in Section 18, the Clinton was found at 3,354-3,409 ft., with 5 bbl., natural, increasing to 30 bbl. in 24 hours after a 120-qt. shot. The same operator completed 1 Q. M. Neldon, Section 23, New Castle Township, Coshocton County, as an 80-bbl. well. The Clinton at 3,220-82 ft., made 10 bbl., natural, and was shot with 150 qt.

Mickey and Workman 4 Maurea Hawk, Section 13, Perry Township, Coshocton County, showed for 4 bbl. of oil, natural, and 44 bbl. in 24 hours after a 130-qt. shot. Clinton sand was logged at 3,111-67 ft.

Fierbaugh and Ringler completed their third well south of Butler. On B. and B. Bowman, Section 30, Worthington Township, Richland County, the Clinton at 2,378-86 ft. gaged 1,700,000 cu. ft. of gas natural.

# Permian Basin

## Glasscock County Tests Extend Spraberry Trend

MIDLAND.—The Spraberry trend moved into southwest Glasscock County at two points this week. El Capitan Oil Co. completed its 1 Whitehouse, and Sohio Petroleum Co. 1 Davenport had 3,500 ft. of oil in the hole and was preparing to test.

The completion was in SE SW 47-37-4S-T&P, about 3 miles north of the southwest corner of Glasscock County. El Capitan 1 Whitehouse topped the Spraberry at 6,964 ft. on elevation of 2,731 ft., and was drilled to 7,028 ft. The well flowed 251 bbl. of oil in 24 hours while drilling the pay section with cable tools and on completion potential gaged 322.23 bbl. of oil in 24 hours through ½-in. tubing choke.

Sohio Petroleum had a prospective strike in the northwest corner of Section 14, just 2½ miles south of the 1 Whitehouse. Top of the Spraberry was 6,920 ft., on elevation of 2,721 ft. Operators reported 3,500 ft. of clean oil in the hole after drilling to 6,942 ft. Casing had been set at 6,864 ft. and operators were to drill deeper after swabbing the oil. Sohio was reported to have staked locations for 5 tests in Section 14.

Sohio's tests in the open area between the Germania and Tex Harvey fields had oil in the hole but required additional work. The 1 Boone had total depth at 7,140 ft. and was to swab some 3,500 ft. of oil then Hydrafrac open hole between 7,005-7,140 ft.

Sohio 1-A Hutt was waiting on Hydrafrac treatment after injecting acid into open hole from 7,195-7,323 ft., total depth. No. 1-B Hutt was drilling in the Spraberry at 7,282 ft. with some 3,000 ft. of clean oil in the hole. Sohio had three offsets staked to its 1 Boone, all in Section 42-36-2S-T&P.

Sinclair Oil & Gas Co. completed its 7-C June Tippett Sanders as the most northerly producer for the Peck field of Midland County. The 1½-mile extender was finaled on the pump for 39 bbl. of 53°-gravity oil a day from the Ellenburger at 13,248-13,320 ft. On earlier tests it had flowed 238 bbl. of oil in 24 hours from the same pay section. The 7-C Sanders also had good shows of oil in the Wolfcamp section.

Gulf Oil Co. 2-B-P-SI Glass, Martin County wildcat, reported the following gages following acid treatment of the Fusselman between 12,100-80 ft.: In 1 hour it flowed 49 bbl. of oil; then 204 bbl. of oil and 203 bbl. of acid water through ½-in. choke in 9 hours; 28 bbl. of oil in 1 hour; and 63 bbl. of oil in 4 hours.

Spartan Drilling Co. prepared to complete its 1 Phillips, Howard County wildcat, as a Clear Fork discovery. The well was originally planned as a Pennsylvanian test. Perforations from 4,670-4,700 ft. developed 15 bbl. of oil an hour by swabbing before acid treatment. Following treatment, the well kicked off without swabbing and made 90 bbl. of new oil in 6 hours through 13/32-in. choke. Location is about 3 miles north of the Bond Canyon field.

Southern Mineral Corp. 1 Weaver, Howard County wildcat northeast of Coahoma, was drilling ahead following a drill-stem test at 7,665-97 ft. which developed 10 ft. of mud with a slight show of oil. The well had oil in the pits previous to the test.

In southern Garza County, Humble Oil & Refining Co. 1 Justice, offset to a 1950 Strawn discovery, developed 200 ft. of oil and gas-cut mud and 900 ft. of clean oil on a 70-minute drill-stem test in the Wolfcamp at 4,558-4,740 ft. Second test from 4,840-65 ft. recovered mud and drilling was resumed. According to reports, the discovery and only producer, had no shows in the Wolfcamp.

Northeast of Post, Continental Oil Co. 1 Welch was attempting a drill-stem test in sand, identified as Leonard (lower group of the Permian), at 5,495-5,540 ft. Mechanical trouble developed on first attempt. The well encountered sulfur water at 8,350 ft. and was plugged back.

**WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS**

Coke County: Al G Hill 2 R. H. Harris, Winfield Scott Sur. 10, 1 mi. S Lygay field, TD 6,860 ft., perf. 6,771-75 ft., flowed 104 bbl. 41°-gravity oil, 8/64-in. choke, TP 1,135 psi., GOR 954 cu. ft.

Loving County: Chapman 1 W. W. Webb, 1-57-T1-T&P, TD 3,158 ft., elev. 2,888 ft., Delaware sand 3,146 ft., pumped 12 bbl 41°-gravity oil.

Pecos County: W. K. Garnett 1 William-Eaton, 1-166-Reuben Phares Sur., TD 2,834 ft., elev. 3,015 ft., Yates 2,814 ft., pumped 20 bbl. 34°-gravity oil.

Upton County: James H. Snowden et al 1-19 Johnie Graham, 19-N-HE&WT, TD 7,197 ft., pay 7,167 ft., flowed 404 bbl. 37°-gravity oil, 3/8-in. choke, GOR 614 cu. ft., TP 600-225 psi.

**WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES**

Andrews County: Buffalo Oil Co. 1-F Fasken, 19-41-1N-G&MMB&A, dry, TD 4,945 ft., Grayburg 4,680 ft.

Markham & Cone 1 Southern Petroleum, 23-A28-PSL, dry, TD 7,580 ft., Clear Fork 6,068 ft., Tubb 6,625 ft.

Coke County: Pan American Production Co. 1 L. M. Stone, 46-Z-G&SE, dry, TD 7,140 ft., Ellenburger 6,926 ft.

Crane County: J. C. Maxwell 1 A. R. Eppeneuer, 1-6-H&TC, dry, TD 3,316 ft., San Andres 2,292 ft.

Crockett County: Continental Oil Co. 2 C. T. Harris, 15-3-WCRR, dry, TD 9,644 ft., Devonian 8,605 ft., Silurian 8,850 ft., Fusselman 8,971 ft., Simpson 9,000 ft., Ellenburger 9,426 ft.

Continental Oil Co. 3 C. T. Harris, 16-3-WCRR, dry, TD 9,090 ft., Spraberry 5,345 ft., Dean 6,460 ft., Devonian 8,790 ft.

Moore Exploration Co. 1 Don Ryburn, 3-Q-MK&T, dry, TD 8,150 ft., Pennsylvanian 6,700 ft., Devonian 7,178 ft., Simpsan 7,510 ft., Ellenburger 7,880 ft.

Culberson County: I. B. Barkley 1 W. A. Scott, 23-114-PSL, dry, TD 2,005 ft.

Gaines County: Intex Oil Co. 1 P. S. Dunbar, 25-A12-PSL, dry, TD 7,675 ft., Glorietta 5,610 ft., Clear Fork 6,045 ft., Tubb 6,590 ft., Wichita 7,210 ft.

Hockley County: S. F. Hurlbut 1 E. P. Ellwood, 8-A-PSL, dry, TD 10,300 ft., Glorietta 5,450 ft., Clear Fork 6,080 ft., Strawn 10,050 ft.

Howard County: Amerada Petroleum Co. 1 R. T. Shafer, 33-25-H&TC, dry, TD 7,525 ft., Spraberry 4,880 ft., Dean 6,020 ft., Pennsylvanian 6,835 ft., reef 7,492 ft.

W. M. and A. P. Fuller 1 Ela C. Sugg, A. M. Thorpe Sur. 1,152, ury, TD 1,305 ft.

Pecos County: Hunt Oil Co. 28 Elsinore, 55-B-GC&SF, dry, TD 2,582 ft.

Hunt Oil 29 Elsinore, 61-A-GC&SF, dry, TD 1,381 ft.

Stanolind Oil & Gas Co. 1-A M. H. Yates, 544-1-I&GN, dry, TD 2,955 ft., San Andres 1,570 ft., San Angelo 2,565 ft.

Sutton County: Ralph Lowe 1 Alison, Sec. 4, J. A. McGonagil Sur., dry, TD 7,912 ft., Strawn 5,310 ft., Hickory sand 7,668 ft.

Tom Green County: Bridwell et al 1 wm. B. Wilson, 8-16-H&TC, dry, TD 6,468 ft.

Velma Petroleum Corp. et al 1 Lela Marcn Neill, Sec. 17, T&NO Sur., dry, TD 7,010 ft., Strawn 5,755 ft., Ellenburger 6,895 ft.

# Canadian Fields

## Cretaceous Flow Increased At Campbell Area Venture

CALGARY. — Wagner - Matlo - Dillabough-Ad Astra 3, a venture that struck oil in the Lower Cretaceous recently, ran another drill-stem test in the zone and had a flow of oil to the surface. Crew went in with a shorter tail pipe during this latter test and as a result received a smaller volume of natural gas and more oil. Operators now plan to complete the well for production tests at current bottom 3,685 ft.

The well, located in the Campbell area, about 2 miles northeast of Cretaceous oil production, is in LSD 12, 36-54-25w4. Latest test, 75 minutes in duration, was run in less than 1 minute, with maximum rate of 300,000 cu. ft. daily, while oil flowed in 59 minutes. When pipe was being pulled it partially cleared itself, and ultimate recovery was 1,440 ft. of oil, no water.

The first test that showed oil at the well was run from 3,669-85 ft., with gas flowing at an estimated rate of 4,000,000 cu. ft. daily accompanied by an oil spray. Recovery was 200 ft. of oil, no water. Gravity of the oil is reportedly between 34° and 36°. Crew reamed to bottom 3,685 ft., ran electrolog, and planned to set string of production casing and commence installation of tankage immediately. The plan is to take production from the bottom 11 ft. of the zone.

New British Dominion Oil Co., Ltd., and Mid-Continent Oil & Gas Co., Ltd., struck a good flow of natural gas in the Bow Island at their exploratory well in the Pakowki Lake-Manyberries area of southeast Alberta. The well is located on a 20,000-acre Crown Reservation, and is scheduled to be carried down to the Devonian. It is British Dominion-Mid-Continent-Etzikom 1, in LSD 4, 29-6-8w4, around 35 miles north of the Montana border. Company officials stated that the well encountered 13 ft. of continuous highly porous sand in the Bow Island interval at 2,227-40 ft. A 15-minute drill-stem test from 2,222-42 ft., through ¾-in. choke, gave a flow of natural gas to the surface immediately, with maximum rate of 3,310,000 cu. ft. daily. Crew is now drilling ahead in search of lower objectives.

Barons Oil, Ltd., Central Leduc Oils, Ltd., and Del Rio Producers, Ltd., have reached an agreement for a joint offset development drilling program at Barons, scene of a Cretaceous sand oil strike 7 months ago, where six step-out failures are located around ¾ of a mile in all directions from the discovery. The Barons area, located in southern Alberta, is around 80 miles southeast of Calgary. The agreement involves all of Section 15-12-23w4, with the exception of LSD 10, on which Barons 1 producer is located, and LSD 7, the 40-acre tract to the immediate south of the discovery. The program calls for a minimum of two wells to be drilled without delay on locations offsetting the producer. Exact sites have not yet been announced.

**CANADIAN SUCCESSFUL WILDCATS**

Pan Western-Homestead-Baxter Lake 1, LSD 2, 6-47-5w4, TD 2,015 ft., 5,800,000 cu. ft. gas daily.

Imperial-Qui Barre 1, LSD 5, 8-55-25w4, TD 5,875 ft., 3,165,000 cu. ft. gas daily.

**CANADIAN WILDCAT FAILURES**

Albercan-Sun-Lure 1, LSD 1, 28-37-11w4, TD 3,725 ft.

Pacific-Little Smoky Lake 3, LSD 6, 23-75-22w4, TD 3,254 ft.

Sun-Albercan-Royalite-Vernon 1, LSD 4, 28-29-1w4, TD 3,442 ft.

Western-Dome-Thelma 21-16, LSD 16, 21-34-12w4, TD 4,348 ft.

**EASTERN CANADA**

ONTARIO.—In Lambton County, Ontario, Imperial Oil-Union Gas 20, joint test in Lot 10, Concession 2 Moore Township is completing as the largest gasser in Ontario since the completion of Imperial-Payne 1 some 2 years ago.

Imperial - Union 20 encountered a gas flow, estimated 1,500,000 cu. ft. a day, at 1,851 ft. It was cemented before drilling in, and at 1,856 ft. blew in with a flow estimated at 7,500,000 cu. ft. or more. It will be finished at this depth without deepening into the reef. Location is 5 miles northeast of Wilkesport, and north of the Becher field, opened some years ago in Sombra Township.

Richfield Oil & Gas 4, drilled by Chatham interests on the John D. Graham farm, Lot 6, Aldborough Township, Elgin County, was finished as a shallow oil well at around 400 ft. with 150 bbl. a day initial production, and settled production of 60 to 100 bbl. a day anticipated. Three previous tests by the same company on a 2,000-acre tract in the past 2 years, resulted in small producers, now making around 6 bbl. a day each. Richfield 4 drilled through some 40 ft. of oil rock. Production is 41°-gravity crude. The potential area, between Concessions 3 and 7 Aldborough, is near Rodney.

# Rocky Mountain

## Three Encouraging Prospects Spark Denver-Julesburg Play

DENVER.—Three new discoveries may be made as a result of tests in Denver-Julesburg basin wildcats this week. Ohio Oil Co. recovered 2,180 ft. of oil on drill-stem test of the third Dakota between 4,793-4,803 ft. at 1 Reimer, NE SE SE 15-16n-50w, Reimer area, Cheyenne County, Nebraska. The wildcat is 10 miles northwest of Gurley pool and 10 miles north of Huntsman pool, where Ohio has third Dakota production. The company is drilling below 4,813 ft. on the well prior to completing after recovery on the 30-minute test.

Another apparent strike in Nebraska is Nebraska Drillers 1 Torgeson, SE NW NW 23-14n-56w, in the Kimball area, Kimball County, west of previous production in this portion of the basin. This well topped "J" sand at 6,508 ft. and on a 1 hour drill-stem test at 6,529-40 ft. made 470 ft. of oil and 100 ft. of oil-cut mud. The operator is running casing to the top of the saturated zone for completion.

In the Colorado portion of the basin, Fisher-Stout of Denver are now testing on the Pruett wildcat, Logan County, after encountering saturation in the "J" sand. The well is 1 State, NW NW SE 36-6n-54w, and found shows in the "D" sand (Muddy) but tested only 150 ft. of gas-cut mud in that zone. A test of the "J" sand between 4,600-35 ft. failed and the zone is being retested. Plains Exploration Co. of Denver is still testing at 1 Dalke, SE SE SW 22-8n-54w, an apparent discovery in the Logan area, Logan County, after recovering water from the basal "J" sand zone on initial tests. The operator will squeeze the lower zone and continue testing. This well flowed oil in 51 minutes on drill-stem test of the "J" sand. New operators moving into the basin with wildcat locations are Lion Oil Co., with a location for a pre-Cambrian test in Yuma County, Niloco Oil Co. of Dallas, with a new location for a Cloverly series test in Washington County.

Amerada Petroleum Corp. is moving in materials for the two new wildcats along the extensive Nesson anticline, northwestern North Dakota. Well 1 Binhomer-Risser, C SW SE 12-49n-96w, is in the Croff area, McKenzie County, 35 miles south of 1 Iverson strike, and 1 Bakken, C SW NW 12-157n-95w, is in the Tioga area, Williams County, 10 miles north of the deep test. At 1 Iverson, Amerada is still fishing stuck drill pipe with total depth at 11,955 ft., 212 ft. below the bottom of 5½-in. casing cemented at 11,743 ft. This well flowed oil from the Devonian-Silurian section between 11,630-60 ft. several weeks ago. On the east side of the Williston basin, Union Oil Co. of California et al are drilling below 2,740 ft. at the Munich area wildcat in the NW NW NW 28-159n-63w, Cavalier County.

In Wyoming, Amerada made location for a Madison test at 1 Unit, NW SE SE 7-43n-89w, Washakie County. Husky Oil Co. will drill a 5,500-ft. Tensleep test at 1 Lox, C SW NW 35-37n- 86w, Natrona County. Atlantic Refining Co. is drilling the third of a series of tests in Fish Creek area, SW NE NE 8-31n-84w, Natrona County. At West Meadow Creek unit, Johnson County Sinclair Oil & Gas Co. has made location for 1 Unit, SW NW SW 5-41n-78w, for a Lakota sand test.

In Colorado, British-American Oil Producing Co. is drilling in the "D" sand at 1 Ramey, NE SW SW 2-9n-52w, a wildcat on the Greenewalt block, Logan County.

Three important wildcats are starting in Montana. The Texas Co. will drill 1 Davies, C SE SW 4-29n-18e, Bearpaw Moun-

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tain region, Blaine County. Amerada's 6,500-ft. Madison test at McTwiggan area, Garfield County, will soon start in the C NW NW 1-14n-32e. General Petroleum is starting a Madison well in the Agawam area, NW NE NE 5-26n-4w, Teton County, where the company last year drilled a Devonian failure.

### WYOMING WILDCAT FAILURE

Fish Creek, Natrona County: Atlantic Refining Co. 1 Government, SE SW SE 5-31n-84w, TD 1,949 ft., dry, Frontier 1,098 ft., Mowry 1,380 ft., Muddy 1,675 ft.

### COLORADO WILDCAT FAILURES

Kiowa, Elbert County: Robert E. Martin 1 Ellsworth, SW NW SE 23-9s-63w, TD 7,700 ft., dry, Niobrara 7,525 ft.

East Sterling, Logan County: Sohio Petroleum Co. 1 State, NW SE SE 24-8n-51w, TD 4,836 ft., dry, Niobrara 3,553 ft., Ft. Hays 3,898 ft., Codell 3,939 ft., Carlile 3,945 ft., Greenhorn 4,144 ft., "D" sand 4,388 ft., "J" sand 4,505 ft., "M" sand 4,679 ft., "O" sand 4,740 ft., "R" sand 4,777 ft., "T" sand 4,805 ft.

### UTAH WILDCAT FAILURE

Bonanza, Uintah County: Roy M. Johnson 1 fee, SW SW SW 27-9s-25e, TD 2,162 ft., dry.

### NORTHERN NEW MEXICO SUCCESSFUL WILDCAT

South Governador, Rio Arriba County: Thomas Doswell 1-B Federal, SE NW NW 15-26n-6w, TD 2,929 ft. 1,900,000 cu. ft. of gas in 3 hrs., Pictured Cliffs 2,857 ft.

### NORTHERN NEW MEXICO WILDCAT FAILURE

Sandoval County: James D. Hancock 1 Brown, NE SW SW 33-21n-5w, TD 5,623 ft., dry.

## Illinois-Ind.-Ky.

### Clay County Discovery Swabs 60-Bbl. Per Hour

NATIONAL ASSOCIATED PETROLEUM CO. appears to have made an exceptionally good oil discovery in southwestern Clay County, Illinois, where its 1-A Noble Spiker, SW SW SW 7-3n-6e, swabbed and flowed at the rate of 60 bbl. per hour while testing saturation in McClosky lime at 2,894-99 ft. Location of the well is about 5 miles northwest of Flora and about 2 miles from other production, the nearest being to the south in the North Kenner pool.

Another wildcat located about 7 miles to the southwest of the Spiker well in the area a little more than 2 miles southwest of the original Kenner pool, same county, also is showing for production. It is Ward W. Dayton 1 Campbell, SE NW SE 11-2n-5e, which swabbed 1½ bbl. of oil per hour from broken Cypress sand at 2,505-31 ft. while cleaning out after a 25-qt. shot. Hole is open below 2,498 ft.

Slagter Producing Co. also has discovered a prospective new pool located about 10 miles north of Evansville, Vanderburgh County, Indiana, in the SW SE SW 35-4s-10w. Its 1 Russell Chandley, SW SE SW 35-4s-10w, found excellent saturation in Cypress sand at 1,884-92 ft. A drill-stem test of this interval, with tester open 2 hours, recovered 160 ft. of clean oil and 90 ft. of oil-cut mud. There was no indication of water. Bottom-hole pressure registered 520 psi. With bottom of the hole still in saturated sand, casing has been run to 1,878 ft. Nearest production is in the Stacer pool, 2 miles to the northwest.

B. M. Heath and Inland Producers Co. have run casing to test saturation logged in broken Tar Springs sand at their 1 Brown, SE NE SE 16-5s-14w, ¾ mile south of the New Harmony pool and a mile west of Mink Island production in the Wabash River bottoms, White County, Illinois. Saturation was logged at 2,256-64 ft. and 2,268-71 ft. Approximately 1,590 ft. of clean oil was obtained in a drill-stem test, open 2 hours. Bottom-hole pressure was 610 psi.

Noah Petroleum Co. 1 Winter, SW SE NW 25-4s-9e, ½ mile from production in the Sumpter pool area, White County, swabbed at the rate of 385 bbl. of oil per day while testing its prospective Tar Springs pay zone at 2,537-47 ft. Testing followed a 25-qt. shot in the zone.

### ILLINOIS SUCCESSFUL WILDCATS

Edwards County: Burr Lambert 1 Betebenner, NW SW NE 13-1n-10e, IP 50 bbl., Waltersburg 2,424-37 ft., TD 2,437 ft.

Wayne County: Mammoth Production Co. 1 Davis, SE NE SW 2-1s-7e, IP 50 bbl., O'Hara 3,152-70 ft., TD 3,268 ft.

### ILLINOIS WILDCAT FAILURES

Bond County: J. W. Everhart 1 Enloe, SE NW NW 6-4n-2w, dry, TD 2,422 ft.

Clay County: Shulman Brothers 1 Williams, NW SW NW 25-5n-6e, dry, TD 2,449 ft.

Fayette County: C. J. Simpson Drilling Co. 1 Burnside, SW SW SW 16-4n-1w, dry, TD 1,403 ft.

Milton Smith 1 Kinney, NE SE NE 28-4n-1w, dry, TD 1,624 ft.

R. L. Robbins 1 Murray, NE NE SE 29-4n-1w, dry, TD 1,394 ft.

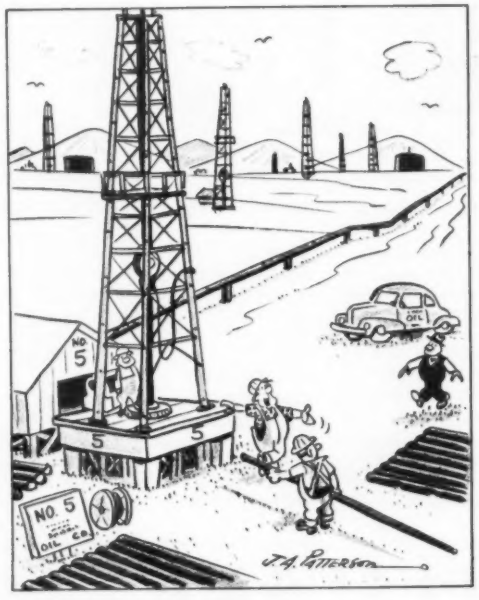
T. S. Doran 1 Blomberg, SE SE SW 35-5n-4e, dry, TD 2,711 ft.

Franklin County: Bump Oil Co. 1 Epperson, SW SW NE 14-6s-1e, dry, TD 2,830 ft.

Carter Oil Co. 1 Trustee Tract 24, SW NW NE 1-7s-4e, dry, TD 3,463 ft.

Hamilton County: A. J. Walker 1 Maulding, NW NW SE 28-4s-7e, dry, TD 3,548 ft.

Jasper County: Nathan C. Daviess 1 Harding, NW NW SE 7-5n-11e, dry, TD 3,008 ft.

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Denton-Spencer Co., Ltd., Calgary, Alberta, Canada.

Lawrence County: Dee Miller Drilling Co. 1 Sutherland, NW SE NE 6-2n-12w, dry, TD 2,290 ft.

Madison County: M. A. Eisenstein et al 1 Conrad, SE NE SW 29-5n-6w, dry, TD 1,842 ft.

J. W. Everhart 1 Heachen, NW NW SE 9-5n-5w, dry, TD 1,990 ft.

H. E. Livermore 1 Albrecht, NE NE SE NE 24-6n-7w, dry, TD 600 ft.

Perry County: Falcon Seaboard Drilling Co. 1 Steed, NE NE SW 20-4s-3w, dry, TD 1,549 ft.

Richland County: George & Wrather Drilling Co. 1 Weagel, NW SE SE 22-2n-14w, dry, TD 3,127 ft.

Ashland Oil & Refining Co. and associates 1 Dodds, NE NE NW 36-3n-10e, dry, TD 3,324 ft.

Wayne County: Collins Brothers Oil Co. 1 Schantz Heirs, SE SW NW 28-1s-9e, dry, TD 3,388 ft.

Nation Oil Co. 1 Nation, NW NW SE 23-2s-6e, dry, TD 3,318 ft.

White County: J. B. Buchman-C. E. O'Neal 1 Wallace, NE SE SE 4-4s-10e, dry, TD 3,325 ft.

**INDIANA SUCCESSFUL WILDCATS**

Gibson County: Calvert Drilling, Inc., 1 Sanders, NW NW NW Militia Donation 74-1s-10w, IP 10 bbl., Hardinsburg 1,330-38 ft., TD 1,925 ft.

Coy Oil, Inc., 1-A Skiles, NE SW NE 18-3s-13w, IP 55 bbl., Cypress 2,547-59 ft., TD 2,559 ft.

Pike County: Cline-Lambert et al 1 Charity Farm, NE SE NW 31-1s-7w, IP 22 bbl., Cypress 1,104-65 ft., TD 1,399 ft.

**INDIANA WILDCAT FAILURES**

Dubois County: Sunlight Coal Co. 1 Buchlein, SE SE NE 5-2s-14w, dry, TD 1,585 ft.

Gibson County: Coy Oil, Inc., 1 Skiles, NW SE SE 7-3s-13w, dry, TD 2,963 ft.

Knox County: D-K-S Drilling Co. 1 McGriffen, Militia Donation 176-2n-9w, dry, TD 1,709 ft.

Lawrence County: Charles Bury 1 Clark, E½ SE SE 9-6n-1e, dry, TD 1,602 ft.

Posey County: Slagter Producing Co. 1 Showers, SW SW NE 13-4s-12w, dry, TD 2,656 ft.

Vanderburgh County: A. J. Walker and E. D. Harman 1 Schmidt, SW NW SW 5-7s-11w, dry, TD 1,133 ft.

Vigo County: Pure Oil Co. 1 Zinkeler, NE SE SW 28-10n-9w, dry, TD 2,373 ft.

Great Lakes Carbon Co. 1 Rotz, SW SE NE 27-11n-10w, dry, TD 2,180 ft.

**WESTERN KENTUCKY SUCCESSFUL WILDCAT**

Henderson County: O: D: Vickers 1 McDaniel, NW NE NE SW 8-Q-26, IP 25 bbl., Benoist 1,895-98 ft., TD 1,909 ft. (extends Beal pool).

(Continued on page 143)

Federal Land Bank, NE SE NE 8-16n-7e, was drilled to 2,749 ft. with 5½-in. string set at 2,566 ft., and is being tested at 2,515-22 ft.

**NORTH LOUISIANA WILDCAT FAILURES**

Bossier Parish: Abney Oil 1 Crystal Oil & Refining, NW NE NE 20-20n-13w, dry, TD 1,117 ft.

La Salle Parish: Hunt Oil and Gulf 42 Louisiana Delta Lumber, C SE NW 2-6n-4e, dry, TD 5,540 ft.

Natchitoches Parish: Cockburn et al 1 Louisiana Long Leaf Lumber, 669 ft. S and 1,826 ft. W NEc 3-8n-8w, dry, TD 6,436 ft.

**ARKANSAS WILDCAT FAILURES**

Miller County: Murray et al 1 Loew, SE SW SW 24-15s-26w, dry, TD 4,756 ft.

Nevada County: McAlester Fuel 1 Waller "A," 485 ft. N and 306 ft. W SEc NW NE 1-14s-20w, dry, TD 2,517 ft.

## Louisiana-Arkansas

### Gulf Seeks Cotton Valley Pay In Third Caddo Parish Test

SHREVEPORT.—Gulf Refining Co. has located another deep test in Caddo-Pine Island field, 22-20n-16w, in a third attempt to find Cotton Valley pay in Caddo Parish. The new venture is 281-N Caddo Levee Board, about 2 miles east of the company's 280-N well, and approximately the same distance southwest of the 279-N well. The latter well, 11-20n-16s, was a Pettit discovery earlier this year, opening a new pay in the field, but failed to find production in the Cotton Valley. The 280-N Caddo Levee Board, 20-20n-16w, went to 8,295 ft. in the Cotton Valley; the Pettit at 5,495-5,507 ft. yielded salt water, and operator is preparing to test the Hill sand at 4,632-41 ft.

In the same area, Burnham and Browning 1 Utz, prospective Pettit strike, is going on pump preparatory to completing. Located in 14-19n-16w, the well swabbed 21 bbl. of fluid, 33⅓ per cent oil, in 4 hours after acidizing perforations at 5,514-20 ft.

Another attempt to confirm production in Pool Lake field, Catahoula Parish, has been officially completed as a failure. The latest try in the one-well field was Pan-Am Southern Corp. 3 Gillis heirs, 15-8n-7e, dry at 6,415 ft.

In Richland Parish, C. M. Bagley may extend Tuscaloosa production in Big Creek field ¾ mile to the west. Operator's 1


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William M. Barret, Inc.

Consulting Geophysicists

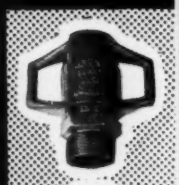
GIDDENS-LANE BUILDING
SHREVEPORT, LOUISIANA



ALTEN

*Stuffing Boxes*

There is an Alten Stuffing Box for every purpose. All models with built in oil reservoir to prevent burning. Alten flexible pull through types are leakproof.



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VENEZUELA

C-54 NEW *luxury*

CONSTELLATIONS

*Flights each way—every day*

CHICAGO & SOUTHERN AIR LINES

Offices in principal Oil Centers in the United States

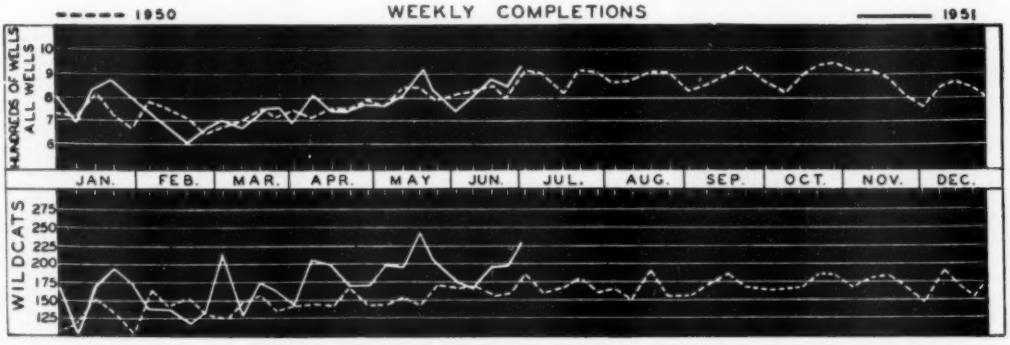
# CURRENT STATISTICS

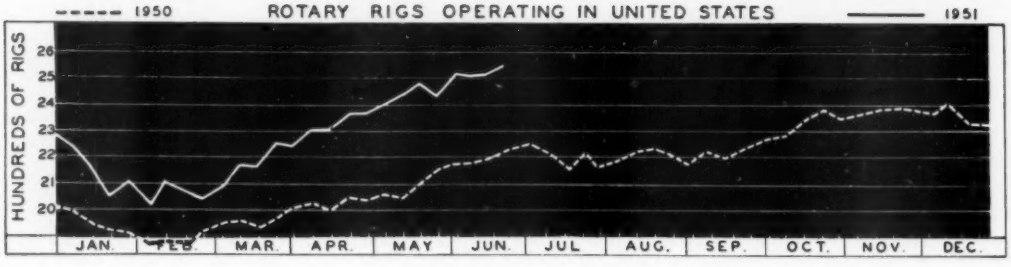
## EXPLORATION

### WEEKLY WELL COMPLETIONS . . . . . WEEK ENDED JUNE 30, 1951

| | Total of all wells | | | | | June 23 | | Wildcat completions and discoveries | | | | | Cumulative total, 1951 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Comp. | Oil | Gas | Dry | Footage | 1951 | 1950 | Oil | Dist. | Gas | Dry | Total | Oil | Dist. | Gas | Dry | Total |
| New York | 10 | 5 | 0 | *5 | 14,056 | 225 | 237 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pennsylvania | 12 | 6 | 1 | †5 | 22,081 | 355 | 471 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| West Virginia | 12 | 4 | 8 | 0 | 32,700 | 272 | 321 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 3 | 8 |
| Ohio | 17 | 8 | 4 | ‡5 | 36,559 | 420 | 473 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 4 | 14 | 19 |
| Indiana | 31 | 14 | 0 | 17 | 57,817 | 537 | 697 | 3 | 0 | 0 | 8 | 11 | 16 | 0 | 1 | 137 | 154 |
| Kentucky | 33 | 8 | 2 | 23 | 57,030 | 530 | 470 | 1 | 0 | 0 | 6 | 7 | 10 | 0 | 1 | 100 | 111 |
| Illinois | 56 | 16 | 0 | 40 | 150,686 | 974 | 1,232 | 2 | 0 | 0 | 21 | 23 | 23 | 0 | 0 | 211 | 234 |
| Michigan | 22 | 6 | 2 | ‡14 | 50,560 | 358 | 412 | 0 | 0 | 1 | 10 | 11 | 13 | 0 | 6 | 144 | 163 |
| Kansas | 107 | 56 | 11 | 40 | 347,221 | 2,095 | 1,779 | 6 | 0 | 1 | 24 | 31 | 110 | 0 | 9 | 410 | 529 |
| Nebraska | 3 | 2 | 0 | 1 | 15,360 | 129 | 49 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 1 | 56 | 61 |
| Oklahoma | 88 | 50 | 3 | *35 | 320,877 | 2,734 | 2,602 | 1 | 0 | 1 | 11 | 13 | 96 | 2 | 15 | 351 | 464 |
| Texas | 407 | 237 | 22 | 148 | 1,897,166 | 8,117 | 7,893 | 13 | 2 | 7 | 83 | 105 | 358 | 32 | 59 | 1,590 | 2,039 |
| North Central (Dist. 7-B & 9) | 112 | 52 | 1 | §59 | 376,712 | 2,500 | 2,456 | 6 | 0 | 0 | 37 | 43 | 177 | 2 | 8 | 689 | 876 |
| West (Dist. 7-C & 8) | 138 | 106 | 0 | 32 | 736,228 | 2,448 | 2,250 | 4 | 0 | 0 | 18 | 22 | 78 | 8 | 4 | 302 | 392 |
| Panhandle (Dist. 10) | 12 | 5 | 6 | 1 | 35,600 | 340 | 471 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 11 | 12 |
| Eastern (Dist. 5 & 6) | 31 | 22 | 1 | 8 | 136,638 | 593 | 588 | 0 | 0 | 0 | 5 | 5 | 4 | 4 | 0 | 110 | 118 |
| Gulf Coast (Dist. 2 & 3) | 65 | 28 | 8 | 29 | 412,146 | 1,140 | 1,095 | 3 | 2 | 3 | 13 | 21 | 53 | 14 | 34 | 231 | 332 |
| Southwest (Dist. 1 & 4) | 49 | 24 | 6 | 19 | 200,642 | 1,096 | 1,033 | 0 | 0 | 4 | 10 | 14 | 45 | 4 | 13 | 247 | 309 |
| Louisiana | 37 | 14 | 6 | 17 | 215,169 | 995 | 1,109 | 1 | 0 | 0 | 4 | 5 | 23 | 3 | 4 | 123 | 153 |
| Northern | 25 | 9 | 6 | 10 | 88,138 | 513 | 627 | 0 | 0 | 0 | 3 | 3 | 6 | 0 | 3 | 70 | 79 |
| Southern | 12 | 5 | 0 | 7 | 127,031 | 482 | 582 | 1 | 0 | 0 | 1 | 2 | 17 | 3 | 1 | 53 | 74 |
| Arkansas | 8 | 3 | 0 | 5 | 27,423 | 190 | 196 | 0 | 0 | 0 | 2 | 2 | 8 | 0 | 1 | 35 | 44 |
| Mississippi | 9 | 3 | 0 | 6 | 47,417 | 149 | 164 | 0 | 0 | 0 | 4 | 4 | 6 | 3 | 0 | 54 | 63 |
| Southeastern States | 1 | 0 | 0 | 1 | 8,016 | 35 | 31 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 14 | 14 |
| Montana | 0 | 0 | 0 | 0 | 0 | 106 | 90 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 25 |
| Wyoming | 12 | 8 | 0 | 4 | 58,892 | 333 | 278 | 0 | 0 | 0 | 1 | 1 | 7 | 0 | 0 | 48 | 55 |
| Colorado-Utah | 4 | 1 | 0 | 3 | 19,947 | 124 | 38 | 0 | 0 | 0 | 3 | 3 | 4 | 0 | 3 | 61 | 68 |
| New Mexico | 14 | 4 | 7 | 3 | 70,923 | 325 | 319 | 0 | 0 | 1 | 1 | 2 | 8 | 0 | 7 | 37 | 52 |
| California | 39 | 25 | 1 | 13 | 158,180 | 1,066 | 840 | 0 | 0 | 0 | 11 | 11 | 22 | 0 | 1 | 209 | 232 |
| Miscellaneous (Md.) | 2 | 0 | 2 | 0 | 10,042 | 24 | 8 | 0 | 0 | 2 | 0 | 2 | 0 | 0 | 15 | 8 | 23 |
| Total United States | 924 | 470 | 69 | 385 | 3,618,922 | 20,093 | 19,809 | 27 | 2 | 13 | 190 | 232 | 709 | 40 | 132 | 3,631 | 4,512 |
| Total previous week | 844 | 488 | 47 | 347 | 3,284,727 | | | 43 | 3 | 3 | 149 | 198 | 682 | 38 | 119 | 3,441 | 4,280 |
| Total June 30, 1950 | 911 | 535 | 57 | 319 | 3,481,173 | | | 27 | 3 | 6 | 143 | 179 | 512 | 36 | 102 | 2,960 | 3,610 |

Service wells included: *5, †4, ‡2, §1.



## DAILY AVERAGE PRODUCTION FOR WEEK

| | June 30 crude oil | B. of M. June demand | June 23 crude oil |
|---|---|---|---|
| Alabama | 3,150 | 2,400 | 3,000 |
| Arkansas | 74,300 | 85,000 | 78,300 |
| California | 968,000 | 976,000 | 967,500 |
| Colorado | 72,200 | 79,000 | 73,200 |
| Eastern | 59,000 | 64,000 | 60,000 |
| Florida | 1,700 | 1,600 | 1,800 |
| Illinois | 167,800 | 163,000 | 168,100 |
| Indiana | 30,100 | 29,000 | 29,700 |
| Kansas | 311,600 | 311,000 | 322,350 |
| Kentucky | 28,600 | 29,000 | 27,600 |
| Louisiana | 613,850 | 638,000 | 614,500 |
| North Louisiana | 115,200 | | 115,850 |
| South Louisiana | 498,650 | | 498,650 |
| Michigan | 40,600 | 42,000 | 39,600 |
| Mississippi | 99,300 | 104,000 | 101,750 |
| Montana | 23,600 | 24,000 | 23,500 |
| Nebraska | 7,050 | 10,000 | 7,150 |
| New Mexico | 143,075 | 142,000 | 143,075 |
| Oklahoma | 506,900 | 515,000 | 505,900 |
| Texas | 2,754,175 | 2,500,000 | 2,754,175 |
| Dist. 1 (Southwest) | 32,925 | | 32,925 |
| Dist. 4 (Southwest) | 258,025 | | 258,025 |
| Dist. 2 (Gulf Coast) | 159,750 | | 159,750 |
| Dist. 3 (Gulf Coast) | 480,075 | | 480,075 |
| Dist. 5 (Eastern) | 53,425 | | 53,425 |
| Dist. 6 (Eastern) | 113,950 | | 113,950 |
| East Texas field | 281,500 | | 281,500 |
| Dist. 7-C (West) | 99,325 | | 99,325 |
| Dist. 8 (West) | 941,125 | | 941,125 |
| Dist. 7-B (W. Central) | 87,075 | | 87,075 |
| Dist. 9 (N. Central) | 158,400 | | 158,400 |
| Dist. 10 (Panhandle) | 88,600 | | 88,600 |
| Utah | 3,900 | 5,000 | 3,800 |
| Wyoming | 195,100 | 180,000 | 194,500 |
| Total United States | *6,104,000 | 5,900,000 | 6,119,500 |
| Change from prev. week, down | 15,500 | | |
| Canada | 164,048 | | 170,000 |

Total U. S. production January 1-June 30 †18,345,405 bbl.
Same period last year (crude plus cond.) 916,741,415 bbl.

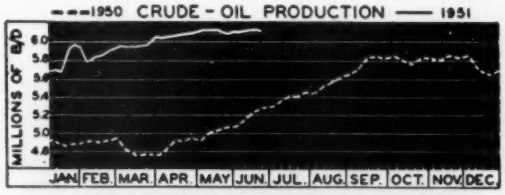
*Not including 103,545 bbl. condensate. †Including 19,334,840 bbl. condensate.

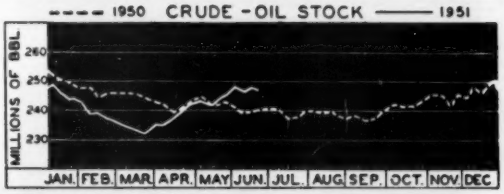
## CRUDE-OIL STOCKS BY STATES OF ORIGIN*

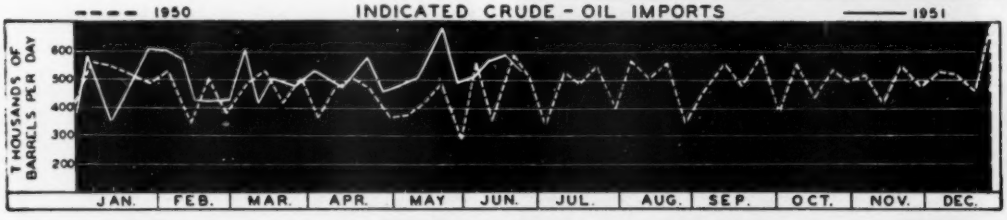
(Thousands of barrels)

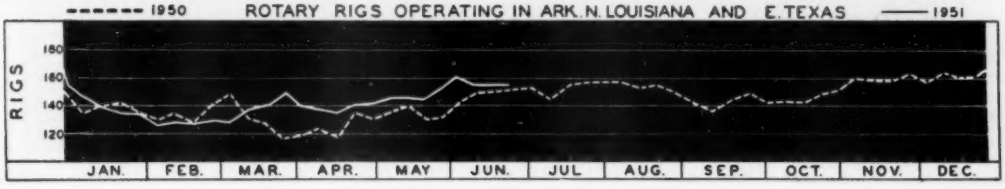
| | June 23, 1951 | June 16, 1951 | June 24, 1950 |
|---|---|---|---|
| Pennsylvania Grade | 2,134 | 2,115 | 2,878 |
| Other Appalachian | 1,528 | 1,539 | 1,684 |
| Illinois, Indiana, Michigan | 11,274 | 10,984 | 9,100 |
| Arkansas | 2,929 | 2,765 | 3,093 |
| Louisiana | 14,499 | 14,525 | 15,635 |
| North | 2,987 | 3,091 | 3,736 |
| Gulf | 11,512 | 11,434 | 11,899 |
| Mississippi | 3,166 | 3,200 | 2,225 |
| New Mexico | 6,634 | 6,637 | 5,672 |
| Oklahoma and Kansas | 37,706 | 38,091 | 33,787 |
| Texas | 115,321 | 115,645 | 112,344 |
| East Texas | 15,057 | 15,285 | 15,801 |
| West Texas | 47,968 | 47,457 | 41,255 |
| Texas Gulf | 24,709 | 25,182 | 27,361 |
| Other Texas | 27,587 | 27,721 | 27,927 |
| Rocky Mountain | 13,946 | 14,241 | 12,533 |
| California | 30,528 | 30,566 | 35,149 |
| Foreign | 7,934 | 8,258 | 6,662 |
| Total | 247,599 | 248,566 | 240,762 |

*Bureau of Mines.



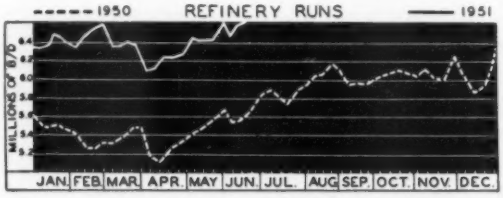

1950 ROTARY RIGS OPERATING IN ARK. N. LOUISIANA AND E. TEXAS 1951
RIGS
180
160
140
120
JAN. FEB. MAR. APR. MAY JUN. JUL AUG. SEP. OCT. NOV. DEC.

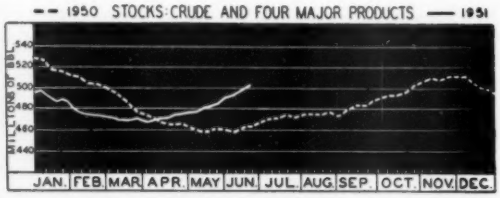
## A.P.I. REFINERY REPORT, JUNE 23

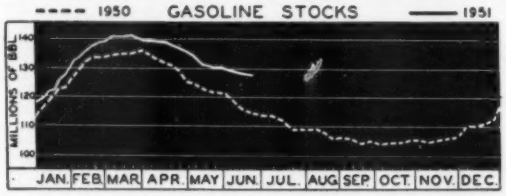
(Thousands of barrels)

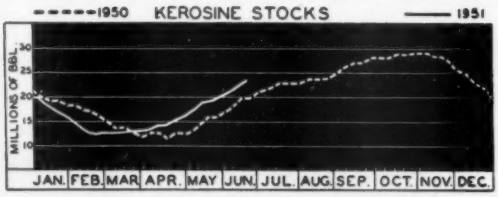
| District— | Daily avg. crude runs | Daily average production | | | | Stocks at refineries, bulk terminals, in transit and in pipe lines | | | | Bureau of Mines, June 1950 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Gasoline* | Kerosine | Distillate | Residual | Gasoline† | Kerosine | Distillate | Residual | Daily avg. crude runs | Daily average production: Gasoline* | Kerosine | Distillate | Residual |
| East Coast | 1,098 | 404.3 | 61.3 | 228.6 | 270.7 | 28,255 | 9,373 | 19,041 | 9,549 | 924 | 399.9 | 33.7 | 183.3 | 187.5 |
| Appalachian: | | | | | | | | | | | | | | |
| District 1 | 107 | 50.0 | 7.6 | 14.1 | 12.1 | 3,000 | 502 | 714 | 320 | 92 | 42.7 | 4.4 | 11.8 | 8.2 |
| District 2 | 69 | 38.3 | 7.3 | 10.1 | 18.4 | 1,445 | 212 | 346 | 228 | 71 | 33.1 | 2.1 | 9.4 | 13.5 |
| Ind., Ill., Ky. | 1,233 | 652.4 | 68.3 | 201.6 | 162.4 | 27,969 | 4,517 | 13,222 | 4,060 | 1,042 | 564.2 | 63.5 | 156.0 | 142.6 |
| Okla., Kans., Mo. | 562 | 293.0 | 22.0 | 124.7 | 69.3 | 14,365 | 1,285 | 7,056 | 1,423 | 502 | 273.2 | 16.1 | 104.3 | 59.6 |
| Inland Texas | 265 | 179.4 | 13.4 | 48.0 | 43.6 | 3,479 | 418 | 1,149 | 831 | 209 | 133.5 | 10.3 | 28.8 | 43.6 |
| Texas Gulf Coast | 1,582 | 728.1 | 124.7 | 321.3 | 263.3 | 18,593 | 4,022 | 7,862 | 4,747 | 1,189 | 561.2 | 88.0 | 246.1 | 209.1 |
| La. Gulf Coast | 505 | 248.7 | 26.7 | 137.6 | 67.6 | 6,764 | 2,138 | 3,394 | 1,848 | 456 | 224.7 | 44.0 | 100.5 | 59.4 |
| N. La. and Ark. | 75 | 29.4 | 7.1 | 17.3 | 6.9 | 2,423 | 432 | 911 | 80 | 68 | 25.2 | 5.9 | 14.0 | 10.2 |
| Rocky Mountain: | | | | | | | | | | | | | | |
| New Mexico | 13 | 7.9 | | 2.6 | 3.0 | 97 | | 59 | 31 | 14 | 7.6 | 0.4 | 2.3 | 3.8 |
| Other Rocky Mtn. | 229 | 112.7 | 3.6 | 48.1 | 53.6 | 5,362 | 277 | 1,484 | 983 | 197 | 85.9 | 4.2 | 36.5 | 35.0 |
| California | 911 | 413.9 | 25.1 | 104.0 | 357.9 | 15,984 | 595 | 7,731 | 16,547 | 891 | 397.0 | 10.0 | 144.0 | 296.1 |
| June 23, 1951 | 6,649 | 3,158.1 | 367.1 | 1,258.0 | 1,327.9 | 127,736 | 23,771 | 62,969 | 40,647 | 5,655 | 2,748.3 | 282.6 | 1,037.0 | 1,068.6 |
| June 16, 1951 | 6,588 | 3,127.9 | 364.0 | 1,218.7 | 1,309.9 | 128,467 | 23,015 | 60,274 | 39,659 | | | | | |
| June 24, 1950 | 5,636 | 2,803.7 | 285.9 | 981.1 | 1,065.9 | 115,036 | 20,165 | 50,580 | 41,291 | | | | | |

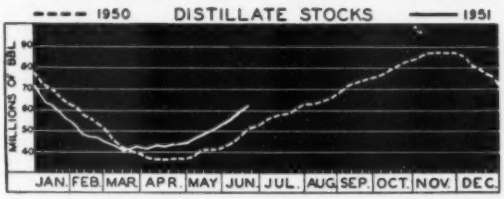
*At refineries including natural blended. †Finished and unfinished.

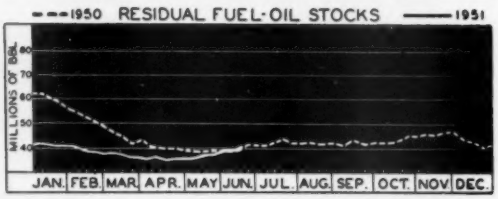


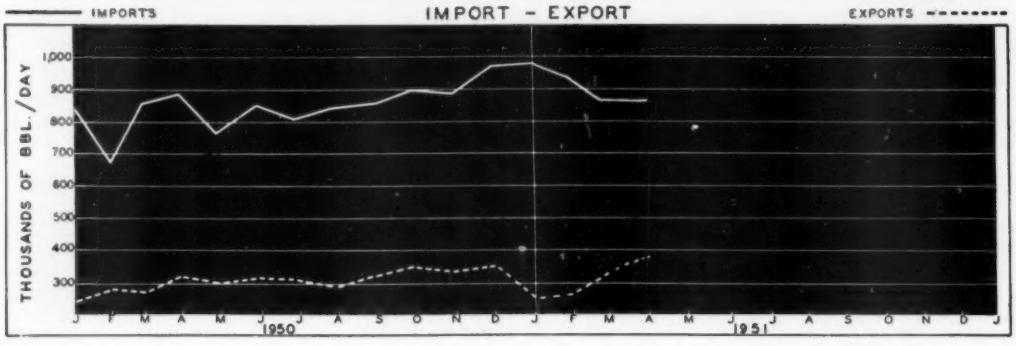



## CRUDE PRICES
### GRAVITY SCHEDULE

| | Signal Hill, Calif.‡ | Oklahoma, Kansas | Gulf Coast Tex.* | West Tex.† |
|---|---|---|---|---|
| 18-18.9 | $1.93 | | | |
| 19-19.9 | 1.98 | | | |
| 20-20.9 | 2.03 | $2.25 | | $2.12 |
| 21-21.9 | 2.07 | 2.27 | | 2.14 |
| 22-22.9 | 2.12 | 2.29 | | 2.16 |
| 23-23.9 | 2.18 | 2.31 | | 2.18 |
| 24-24.9 | 2.24 | 2.33 | $2.56 | 2.20 |
| 25-25.9 | 2.30 | 2.35 | 2.58 | 2.22 |
| 26-26.9 | 2.36 | 2.37 | 2.60 | 2.24 |
| 27-27.9 | 2.41 | 2.39 | 2.62 | 2.26 |
| 28-28.9 | 2.46 | 2.41 | 2.64 | 2.28 |
| 29-29.9 | 2.52 | 2.43 | 2.66 | 2.30 |
| 30-30.9 | 2.57 | 2.45 | 2.68 | 2.32 |
| 31-31.9 | 2.62 | 2.47 | 2.70 | 2.34 |
| 32-32.9 | 2.68 | 2.49 | 2.72 | 2.36 |
| 33-33.9 | | 2.51 | 2.74 | 2.33 |
| 34-34.9 | | 2.53 | 2.76 | 2.40 |
| 35-35.9 | | 2.55 | 2.78 | 2.42 |
| 36-36.9 | | 2.57 | 2.80 | 2.44 |
| 37-37.9 | | 2.59 | 2.82 | 2.46 |
| 38-38.9 | | 2.61 | 2.84 | 2.48 |
| 39-39.9 | | 2.63 | 2.86 | 2.50 |
| 40 and above | | 2.65 | 2.88 | 2.52 |

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6 1947.

‡Standard Oil Co. of California

## FLAT CRUDE PRICES

Representative posted schedules per barrel

| | |
|---|---|
| East Texas† | $2.65 |
| Kettleman Hills, California* | 2.80 |
| Beauregard Parish | 2.00 |
| Illinois Basin | 2.77 |
| Pecos County, Texas (Yates) | 2.35 |
| Bradford, Pennsylvania | 4.25 |
| Eastern Ill. and Western Ind.† | 2.77 |
| Tomball, Texas Gulf Coast | 2.83 |

*37°-37.9°. †35° and above.

GENERAL trends in petroleum supply and demand as indicated by current production and refining statistics furnish clues that may help explain why crude production and refinery runs remain at abnormally high levels despite large increases in product stocks.

Kerosine and distillate stocks gained 15,564,000 bbl. in the 4-week period ended June 23, or 556,000 bbl. daily. This is about 1,500,000 bbl. greater than primary stock accumulation in the same period last year. Actual refinery production of these products was 7,800,000 bbl. more than in the same 4-week period of 1950, indicating that actual movement to resellers and consumers has been well above last year.

All published forecasts call for new all-time records in demand for home-heating fuel next winter. The rate of movement out of primary storage in June indicates that buying for storage has started early this year. Since no records of secondary and reseller inventories are available, it is not possible to determine how much of the fuel has reached consumer tanks, but a continuation of the movement through July will show that at least part of the material purchased by resellers in June has been sold to consumers.

The unsettled condition in the Middle East and the possibility that other world refineries may have to carry an increased load because of at least partial shutdown of the Abadan refinery are other factors influencing production and runs in this country.

There has been some talk of possible gasoline rationing in this country if the Abadan refiney is down for an extended period, but most industry men agree that it could not come this summer. Current runs and stocks will supply domestic demand plus any summer gasoline exports in the limited number of clean tankers.

## REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of July 2, 1951. Figures, are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

### GASOLINE, KEROSINE, AND FUEL OILS

| | Mid-Continent Group 3 | New York Harbor (barge) | Texas Gulf Coast |
|---|---|---|---|
| Regular gasoline, 80-82 octane | 10¼-10½ | 12-12.75 | 10¾-11 |
| Premium gasoline, 86-88 octane | 11¼-11½ | 13.5-13.75 | 11¾-12 |
| 42-44 w.w. kerosine | 9-9⅜ | 10 | 8½-9 |
| No. 2 straw fuel oil | 8-8⅜ | 9 | 7½-8 |
| No 6 residual | $1.75-1.80 | $2.45-2.60 | $1.75-1.90 |

### NATURAL GASOLINE

| | Group 3 | North Texas | N. La |
|---|---|---|---|
| Grade 26-70 | 5⅛ | 5 | 5¼ |
| Grade 18-55 | 6.6 | 6.1 | 6.35 |

### LUBRICATING OILS

**South Texas**

| | |
|---|---|
| 200 vis., No. 2-3 neutral | 13-13.5 |
| 750 vis., No. 3-4 neutral | 16 |
| 2,000 No. 5-6 neutral | 18-19 |

### LUBRICATING OILS

**Mid-Continent**

| | |
|---|---|
| 150-160 vis., D bright stock, 0-10 pp. | 29-30 |
| 200 vis., No. 3 neutral, 0-10 pp. | 17.5-18.5 |

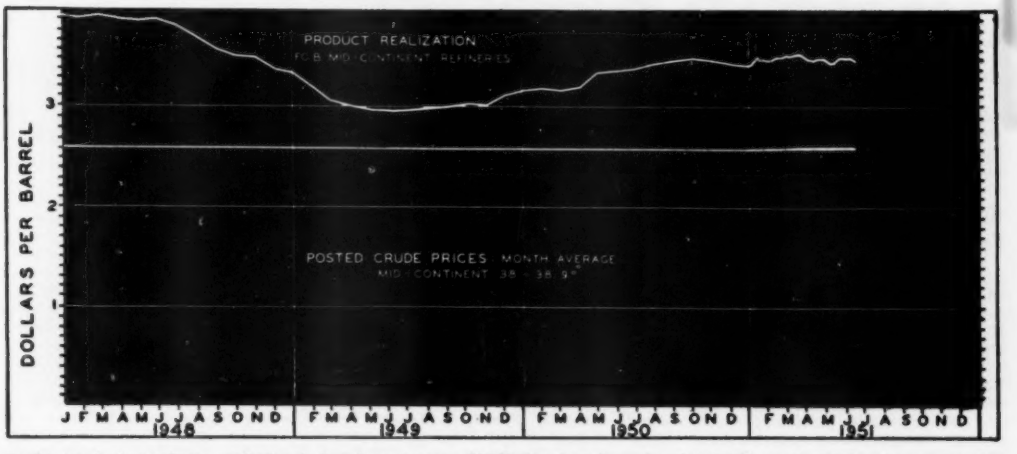
**Western Pennsylvania**

| | |
|---|---|
| 145-155 vis., 10 p.t. bright stock | 33.5 |
| 180 vis., 0 p.t. neutral | 31.5 |

### WAX

**Mid-Continent**

| | |
|---|---|
| 132-134 A.M.P. | 6.0 |


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
POSTED CRUDE PRICES MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
DOLLARS PER BARREL
3
2
1
J F M A M J J A S O N D
1948
F M A M J J A S O N D
1949
F M A M J J A S O N D
1950
F M A M J J A S O N D
1951

*In this trend chart refinery realization is based an average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil. Realization averaged $3.48 for week ended June 23, $3.50 for previous week, and $3.39 for June 1950.*

# EQUIPMENT MEN . . . in the News

## National Supply Creates Two New Sales Divisions

To service the expanding oil and gas-industry requirements in the Southwest, National Supply Co. recently announced the creation of two

J. M. THOMPSON

J. W. BABB

sales divisions with headquarters in Houston and Fort Worth.

The southwest division, with headquarters at Fort Worth, consists of the 20 stores operated by the company in an area comprising northern Louisiana, southern Arkansas, East Texas, North Texas, West Texas, New Mexico, and the Texas Panhandle. James M. Thompson, former manager of the Texas division, is division manager.

The Gulf Coast division, with headquarters in Houston, will be under management of John W. Babb, formerly Houston district manager, and will be comprised of the 15 stores in Mississippi, southern Louisiana, and the entire Gulf Coast region.

National has also announced the establishment of a new two-story store at San Angelo, Tex., to serve the counties of Coleman, Coke, Tom Green, Irion, Runnels, Schleicher, Sutton, Kimble, Menard, Concho, McCullouch, Mason, and Sterling.

J. Marcus Powell, who has been with National for 27 years, and representative in the San Angelo area for the past year and a half, has been appointed store manager.

## Roper Advanced to Sales Post by Air Reduction Co.

Air Reduction Sales Co., a division of Air Reduction Co., Inc., has announced the appointment of Edward H. Roper as manager of the general technical sales department.

Joining Air Reduction in 1936, Roper served in various capacities in the general technical-sales department and was appointed assistant to the manager of the same department in 1944 and in 1948 became assistant manager.

Roper received a Bachelor of Science degree in mechanical engineering from Sheffield Scientific School, Yale University.

## Loveland Is New Works Manager for Halliburton

Russ A. Loveland is the new works manager of Halliburton Portland Cement Co., Corpus Christi.

Loveland was formerly superintendent of Penn-Dixie Cement Corp.'s Nazareth Plant No. 4, Nazareth, Pa. He has had more than 25 years' experience in the cement industry and has held positions of chief chemist, plant engineer, production manager, and research engineer.

## Ives & Co. Appointed as Fitzgibbons Representatives

Fitzgibbons Boiler Co., Inc., has announced the appointment of Clifford B. Ives & Co. as sales representatives for its plate-products division in the Philadelphia area.

In this connection Ives will handle sales of steel-plate products such as heat exchangers, condensers, air receivers, and pressure vessels specially fabricated to the users' own designs and specifications.

## Parrish, Petross Join Oil Base Field Staff

W. H. (Pete) Petross and Harlan Parrish have been added to the field staff of Oil Base, Inc., manufacturers

W. H. PETROSS

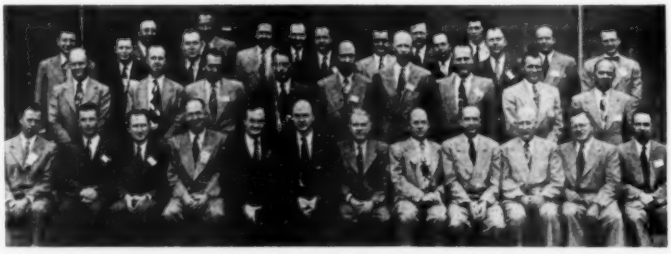
H. PARRISH

of Black Magic, White Magic, and oil-base mud conditioners. Petross will be located at Odessa and Parrish at Midland.

Prior to his association with Oil Base, Petross was coowner of Walker Oil Well Specialties, Inc., Oklahoma City, and prior to this was district manager for Hinderliter Tool Co. in the Rocky Mountain area.

Parrish was analytical chemist for Oklahoma Testing Laboratory and more recently was with Santa Fe Drilling Co.

## Geophysical Service, General Instruments Hold Meet



*Present at a recent supervisory and administrative conference conducted by Geophysical Service, Inc., and General Instruments, Inc., Dallas, were, front row: Ted Ellsworth, West Coast division manager; Bob Dunlap, vice president in charge of sales; Bill Edwards, assistant vice president and secretary, GSI; J. Weldon Thomas, president, Latin American division, GSI; Cecil Green, president, GSI; Erik Jonsson, president GII; Eugene McDermott, chairman of the board, GII; Ken Burg, vice president; Fred Agnich, executive vice president; Dr. H. B. Peacock, chairman of the board, GSI; Fred Romberg, manager, southern division; Charlie Moore, manager, Canadian division. Second row: Paul Hodge, supervisor, West Coast; Virgil Teufel, district supervisor, Shreveport; Chris Elston, instrument supervisor, Houma, La.; Walter F. Joyce, manufacturing manager, GII; Ernie Kiesler, supervisor, Calgary, Alta., Canada; Ray Wright, supervisor, Houston; T. A. Halbrook, supervisor, Calgary; Jack Kohler, supervisor, Mexico City; and Jack McManus, chief field service engineer. Back row: Sam Thompson, Dick Rainey, supervisor, Calgary; Earl Thomas, district supervisor, Austin; Bill Harvey, district supervisor, Midland, Tex.; Clark Allen, district supervisor, Houma; Jim Toomey, GII engineering department; John Dufford, chief industrial engineer; Pat Haggerty, executive vice president, GII; John Imle, field safety engineer; Carl Thomsen, secretary, GII; Frank Borders, Don Rockwell, supervisor, Mexico City; Ed Stulken, chief seismologist; Bob Everett, field personnel manager; and Bill Scott, GII seismic manufacturing engineer.*

## Associated Names Lubbes Manager of West Texas Area

JACK LUBBES

Olive Dorroh, vice president of Associated Oil Field Rentals, Inc., has reported the appointment of Jack Lubbes as manager of its West Texas area.

Lubbes has had previous experience in the oil fields as roustabout, roughneck, driller, and toolpusher. He will make his headquarters in Odessa.

## Geophysical Firm Sold To Georator Corp.

Georator Corp., Arlington, Va., has announced acquisition of the complete business and manufacturing facilities of Geophysical Instrument Co. Manufacture of the same products as previously made will be continued in the geophysical instrument division of the corporation.

The electric-products division of the corporation will continue manufacture of permanent-magnet generators in standard and high-frequency types.

## Leeds & Northrup Move to New Houston Location

The Houston office of Leeds & Northrup Co., Philadelphia, manufacturers of electrical measuring instruments, automatic controls, and heat-treating furnaces, has been moved to a new Houston location.

This move provides more space, and affords correspondingly better facilities for supplying engineering information and service to manufacturers, researchers, and educational institutions in the area from New Orleans to the California line.

## Hill, Hubbell Holds Annual Sales Meeting

*Hill, Hubbell & Co., of San Francisco, recently held its annual 3-day sales meeting at Cleveland's Hotel Statler where sales, production, and advertising problems of the pipe-wrapping industry were discussed. Representatives who attended the meeting were: front row: Earl Brightbill, R. A. McCarthy, M. M. Bowen, Hill, Hubbell manager; Bryan Patterson, and J. C. Maxwell. Back row: C. D. Cobbett, Norman Atchison, R. J. Young, C. L. McGarvey, Lee Maffei, George Hudock, Glenn Killian, and Lee Hamilton.*

## New Officers of P.E.S.A.

*Ted Sutter, left, vice president, Baker Oil Tools and retiring president of Petroleum Equipment Suppliers Association, congratulates new Association President F. M. Mayer, president, Continental Supply Co. Newly elected Vice President Mason B. Jones, vice president of S. M. Jones Co., looks on.*

## Bell Buys Swab Rights From Fort Worth Firm

Sales and manufacturing rights of the Bell tubing and drill-pipe swabs and accessory equipment have been sold by Mechanical Manufacturing Co., Fort Worth, to Bell Rubber Co., Dallas.

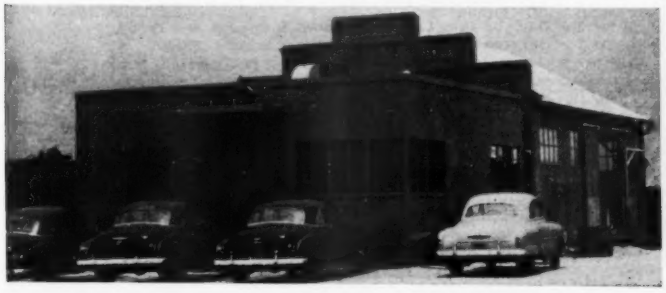
C. W. Scott and Sam P. Hamer are owners of Mechanical, and W. A. Moore, Dallas, is owner of Bell Rubber. V. H. McKimmey, formerly in the sales department of Mechanical, is now sales manager for Bell. Bell Rubber headquarters and factory are located in Dallas.

## Wold Is Named General Manager of Kobe Division

L. T. WOLD

L. T. Wold has been elected vice president of Dresser Equipment Co. and named general manager of the company's Kobe, Inc., Division, according to a recent announcement by J. B. O'Connor, president of Dresser Equipment Co. Wold joined Kobe as controller in 1946 and for the past year has been assistant general manager of the organization.

## Reed Opens New Warehouse in Wichita Falls



**Reed Roller Bit Co., at a recent barbecue in Wichita Falls, opened its new warehouse. J. R. Brandon, division manager, will be in charge. A group from the Houston office headed by R. G. Hamaker, vice president, also attended the opening.**

## Atlas Mineral Announces Expansion of Houston Plant

George L. Wirtz, president of Atlas Mineral Products Co., has announced further expansion of its Houston plant. The new construction will include a modern lining shop and storage facilities which will give the gulf states' industry a modern and

*(Continued on page 142)*

# CLASSIFIED ADVERTISING

Your MARKET PLACE FOR THE OIL AND GAS INDUSTRY...

**DISPLAY CLASSIFIED**
$12.00 a column inch one issue . . .
10% Discount three or more issues.

**UNDISPLAYED CLASSIFIED** 12c a word one issue. 10% Discount three or more issues. $3.00 minimum charge. Blind Box in our care counts nine words. Payable in Advance.

## EQUIPMENT FOR SALE

USED ROTARY AND CABLE TOOL DRILLING TOOLS, WIRE LINES, E. A. KELLY, BOX 861, OKLAHOMA CITY. PHONE 5-6407.

NEW CASING—5½" OD 14# Range 3, 8 Thread, 3,000'. TUBING—2½" Upset, Near New, 1400'. POWER UNIT—International U10, Butane Carb., Complete Clutch and V-Pulley, $485.00. Rebuilt and Guaranteed. Earl Oslin, 1224 Lane, Falls City, Nebraska. Phone Red 744.

FOR SALE: 1 complete rotary rig with Wilson Mogul draw works, powered for a G. A. K. Waukesha Motor. New C-150 Ideal mud pump powered by a new N. K. Waukesha motor. 92' shop made derrick and 4500 ft. of good 3½" drill pipe. Lloyd Sanders, Phone 18F2, Pearson, Okla.

3600 FEET NEW 2⅞" drill pipe. USED Cardwell RL Model Rotary Rig complete. USED Wilson Titan Rotary Rig complete. General Equipment Co., Inc., 815 Daniel Bldg., Phone 2-6764, Tulsa, Oklahoma.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units

**H. H. COFFIELD**
**Attn.: W. H. ORR**
**Phones: 122—Rockdale, Texas**
**AT-3427—Houston, Texas**

**6 FOOT DIAMETER**

**TANK SHELLS**

4 pieces — 16 foot long
⅜" and ⅝" wall

**Write — Wire — Phone**

**SONKEN-GALAMBA CORPORATION**
**2nd and Riverview (X-733)**
**Kansas City 18, Kansas**
**THatcher 9243**

## FOR SALE

Six 125 H.P. Horizontal Clark Engines, Overhead Exhaust. Connected with 3—7¼ X 20 Compressors. Connected with 3—17 X 20 Low Compressors. The best repressure engines on the market for economy and dependability. Located 7 Miles Northeast of Graham, Texas

**KNOX REFINING CO.**
**L. D. 59, Enid, Okla.**

## EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

FOR SALE: One String of Cable Drilling Tools complete with Casing and Derricks. Contact H. H. Blair, 600 Bitting Building, Wichita, Kansas. Telephone #7-3241.

FOR SALE: One Wilson Schneider pump. Size 6X16. Serial No. 10780. Stearns Petroleum, Inc., Box 313, Russell, Kansas.

G-17S—Post War Stagger Wing. Flush Cowl Serial No. B-15. Mfg. Feb. 1947. Relicensed until May 1952. Repainted Red with White Trim. Total Time 1400 hrs. Engine-14B, Prop., Accessories 400 hrs. Fabric and wood Guaranteed Perfect. Very Clean Interior, MN-26C Loop. Full Instruments. Last Stagger Wing off Beach Production Line. No trades. Contact John Lyon, Aviation Dept. Malco Refineries, Inc., Roswell, New Mexico.

**FOR SALE**
**SEAMLESS CASING & TUBING**

5,000' #1 Used H-40 5½" O.D. 8 R.T., R 2
3,000' New H-40 7" O.D., 17# 8 R.T., R 2
3,500' #1 Used H-40 7" O.D., 8 R.T., R 2
40,000' #1 Used 2⅜" O.D., 4.60# 10 R.T., & 10 V.T., R 1 & 2

**LAPWELDED**

6,000' #1 Used 7" O.D., 17# Good condition
3,000' #1 Used 8⅝" O.D., 24#

**ATTRACTIVELY PRICED**

**MICHIGAN CARLON PIPE CO.**
**20120 Livernois Ave., Detroit 21, Michigan**
**DIamond 1-1400**

## EQUIPMENT FOR SALE

PIPE
ALL SIZES: LINE PIPE AND CASING, TANKS, AND OILFIELD SUPPLIES. EDCO PIPE & SUPPLY CO., PHONES 933 OR 1298, DRUMRIGHT, OKLA.

IMMEDIATE delivery complete workover Jack Knife Rig. Details and price on application. P. O. Box 3246, Corpus Christi, Tex.

FOR SALE: One drilling rig complete including 127' Lee C. Moore mast and 7,200' of 4½" drill pipe. Rig capacity 7,500 ft. Now operating in Oklahoma. All equipment A-1 mechanical condition. For further details and inspection write Box E-132, The Oil and Gas Journal, Tulsa, Oklahoma.

2,600 ft. 7" OD 23# J-55 8RT Range 2 Good Used Seamless Casing
4,400 ft. 10¾" OD 40.5# J-55 8RT Range 2 Good Used Seamless Casing
1,900 ft. 16" OD 75# J-55 Good Used Seamless Casing

**FRANK MORRIS & CO.**
**424 S. Cheyenne, Tulsa, Okla..Phone 2-6247**

**BUILDING & EQUIPMENT FOR SALE**

4—160 H.P. type 75, Cooper twin compressor engines; 3—150 H. P. Bessemer engines. Also the following steel buildings: 1—30 X 104 ft., 1—32 X 26 ft., 1—12 X 28 ft. All valves and fittings accompany this plant.

**THE MULLEN COMPANY**
**Box 479, or phone 468, Ardmore, Oklahoma.**

# PIPE FOR SALE!

**THE FOLLOWING ITEMS AND MANY MORE ARE NOW AVAILABLE FOR IMMEDIATE DELIVERY—**

10,000' 2⅜" O.D. 4.6# Used Lapweld, Threaded & Coupled, 11½ Thread.
8,000' 2⅜" O.D. 4.6# Once Run Seamless, Range 2, 10 Rd. Thread.
12,000' 7" O.D. 17# Used Lapweld Casing, T & C, 10 V-Thread.
180,000' ½" Standard Black Pipe, Plain Ends, 21' Lengths.
20,000' 1¼" Standard Black Pipe, Threaded & Coupled, 21' Lengths.
10,000' 1½" Standard Black Pipe, Threaded & Coupled, 21' Lengths.
60,000' 2⅛" O.D. x Approx. .140" Wall 3.2# Reconditioned Seamless Tubing, Plain Ends, 14' Lengths and Over.
20,000' 3" Standard Black Pipe, Plain Ends, 21' Lengths.
20,000' 3½" O.D. x .145" Wall 5.4# Reconditioned Seamless Tubing, Plain Ends, 14' Lengths and Over.
15,000' 4" Standard Black Pipe, Plain Ends, 21' Lengths.

**ACT NOW! PHONE OR WIRE COLLECT YOUR REQUIREMENTS TODAY**

## A. J. STRUBEL, Broker

**SIDney 1791 (Day Phone) HUDson 8152 (Night Phone) 4948 Murdoch, St. Louis, Mo.**

## EQUIPMENT FOR SALE

FOR SALE: Two 6-cylinder Hydraulic casing pulling machines. One 7", 5", 3", seven foot jacks; one 5", 3", four foot jacks. Box E-128, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Bucyrus-Erie Model 36-L Spudder, dual Tires Semi Trailer mounting, Waukesha gas-gasoline engine working now, with or without tools, immediate delivery. Phones 1-5711, 1361, 0421, Ashland, Ohio, 191½ East Main Street.

FOR SALE: 5170' Internal Upset 2⅞" Grade "D" Drill Pipe 10.40#, Range 2, 1.⅝" ID W/Reed FH Tool Joints. Good condition, $1.40 per ft. Lum Price, 417 E. 16th, Houston 8, Texas. Underwood 8945.

FOR SALE: Mayhew 2000 drill. Has drilled two 1000-ft. and one 1700-ft. holes. Mounted on GMC 6 x 6. Has new 145 H.P. auxiliary engines. Rig, elevators, slips, Misc. tools—cash price $17,500. Drilling Bit & Supply Co., Princeton, Indiana.

### 7¼" x 12" MUD PUMP

Model FXZ Gardner-Denver 7¼" x 12" Mud Pump Complete mounted on skids. This has been completely overhauled this month and $2100 of new parts were installed. Priced for a Quick Sale.

**MOUNTAIN IRON & SUPPLY CO.**
**714 Fourth National Bank Building**
**Wichita, Kansas**
**7-4238** **L.D. 239**

### OIL STORAGE TANKS

160,000 gallon capacity
With heater coils

30 foot diameter x 30 foot high
Good Condition
Standing at Kansas City

**Write — Wire — Phone**

**SONKEN-GALAMBA CORPORATION**
**2nd and Riverview (X-732)**
**Kansas City 18, Kansas**
**THatcher 9243**

## EQUIPMENT FOR SALE

FOREIGN SEAMLESS CASING
A. P. I. Specifications. Subject to letter of credit. Box E-179, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Ideal slush pump, Model C-150. Melton Supply Company, Seminole, Oklahoma.

FOR SALE: 1—1947 Model GMC Diesel Tandem 65 Tulsa Winch air equipped, 20 foot body, 12" Roller, 1100x22 tires, is good truck in top shape. Too large for this field. Box 706, Drumright, Oklahoma.

FOR SALE: National 50 rotary drilling rig, NKU Waukesha engines, new Lee C. Moore 130' 515,000# capacity mast with substructure, new 7¼ x 14 Gardner-Denver pump, good drill pipe, everything complete and in first-lass condition. H. Waggoner Drilling Co., Box 4657, Oklahoma City, Okla. Phone 64-1413.

LIGHT PLANT: Model 3GG-30 Stewart & Stevenson AC generator, 3 phase, 60 cycle, 30 KW, 1200 RPM, 440 volts, 39 amps., with a Continental Red Seal 6 cylinder motor, all skid mounted. Completely overhauled and in same as new condition. Brown Pipe & Machinery Co., P. O. Box 2368 Corpus Christi, Texas. Phone 3-9391.

### FOR SALE

Good Used 6⅝" O. D. 8 thread line pipe couplings — cleaned or uncleaned. Write or wire Box 574, Tulsa, Okla.

**LIKE NEW**
**6 x 24**
**WORTHINGTON**
**HORIZONTAL TRIPLEX PUMP**
750 gal. per min. @ 750 lbs. press., Wt. 73,500 lbs.

**300 H.P. G.E. MOTOR**
TYPE I-17B w/STARTER & SWITCHES
580 R.P.M. WT. 7800 lbs.

***SACRIFICE PRICE!***
WRITE—WIRE—PHONE

**J. J. SUGARMAN CO.**
ESTABLISHED 1906
629 SO. HILL ST. LOS ANGELES 14, CALIF.
TEL. TUCKER 3131

## EQUIPMENT FOR SALE

FOR SALE: For immediate delivery one 55 M. BBL. All-steel oil storage tank, match-marked for reerection. Clyde Dampf, Amarillo, Texas. Phone 6-5816, Box 2315

WELL EQUIPMENT: New and used spudders, rotaries, core drills — all sizes and types. Cable tools, drill pipe, bits, pipe, Fishing tools. Everything for Well Service. Pressey & Son, Pueblo, Colorado.

ONE—6¼" x 30' American HT Drill collar; 1—XAHU Waukesha Engine; 1—13¾" Pilot Surface Bit; 2—4" x 5" Piston Type Water Pumps with engines. B. L. Rucker, Phone 1072 or 480, Mount Vernon, Illinois.

FOR SALE: Bucyrus-Erie 36L Skid type Waukesha powered. Complete five and seven inch drilling tools, steel tool house, Kohler light plant, New ⅞ X 4500 Drilling line, ⅞ X 4500 sand line, ⅞ X 450 tubing line. Complete set rod and tubing tools, good timbers, and flooring, steel dump box, and steel tool rack. Rig is in A-1 shape and running at present time. Can give immediate delivery. Two Wilson rod and tubing units, single and double drum, with telescoping poles, complete with all tools and mounted on trucks. Crew cars to go with each unit. Both units fully equipped and in A-1 shape. Guss Irvin Well Servicing Co. Box 112, Stinnett, Texas. Phone 21.

### CASING

Have 6,000' of 9⅝" 36 lb. J-55 Seamless Casing on order for third quarter delivery. Would like to trade this tonnage for 5½" or 7" seamless suitable for 9,600' well. Phone 3-8601, Shreveport, Louisiana.

### PRESSURE VESSELS

| Quantity | Description |
|---|---|
| 1 | 4' x 40' x 4" Forged Seamless |
| 1 | 10' x 30' x ⅞" Riveted & Welded |
| 2 | 10' x 30' x ½" Riveted |
| 2 | 9-2 x 39' x 1 ⅛" Riveted & Welded |
| 1 | 10' x 39-9 x ⅛" x 1" Heads—Riveted—3 Trays x 63 C.I. Bubble Caps/Tray—3 Baffle Plates rated 750 F. |
| 1 | 6' x 28' x ⅜" Riveter—16 Trays, Spacing 16". |
| 1 | 5' x 12-6 x ⅜" Riveted & Welded 5 trays-spacing 20" |
| 1 | 5' x 30' x ⅜" Riveted & Welded, with Tulsa Type Mist Extractor 10 trays-spacing 20" |
| 1 | 3-6 x 50' x ½" Riveted & Welded—4 trays with 16" spacing; 2-4 x 10' condenser on top |
| 3 | 5' x 28' x ⅜" Riveted & Welded |

### STEEL PIPE

6,000' 26" O.D. x .312 Wall Thickness—85.55 lb./ft., 40-50' lengths

### CAST IRON PIPE

| Quantity | Size | Ends | Class |
|---|---|---|---|
| 2,000' | 24" | B&S | 200 |
| 1,500' | 18" | do | 200 |
| 2,160' | 14" | do | 200 |
| 454' | 12" | do | 200 |
| 625' | 8" | PE | 150 |
| 123' | 8" | PLG | 150 |
| 351' | 6" | PE | 150 |

**BROWN-STRAUSS CORPORATION**
1546 Guinotte Phone: Ha. 1000
Kansas City 10, Missouri

15,000 10¾-inch OD Couplings for sale, No. 1 condition, double dutchmen, located in Nebraska and Dallas, Texas, area.

Please contact:

HERMAN KAISER PIPE & SUPPLY CO.
908 Palace Building Tulsa, Oklahoma
Tel.: 3-3413 or 4-6358

## CASING—TUBING

10,000' of 4½" OD, R-2, used seamless casing, new 8rd. thrds. and new casing couplings.

20,000' of 2⅜" OD, 4.60#, 11½ V thrd., 24' lengths, regular, used seamless tubing.

3,000' of 2⅜" OD, 4.70#, 8rd. thrd., R-2, EUE, used seamless tubing.

**BROWN PIPE & MACHINERY CO.**
**P. O. Box 2368, Phone 3-9391, Corpus Christi, Texas**

## EQUIPMENT FOR SALE

PORTABLE DRILLING rig 2000 ft. capacity for core drilling water well or shallow production. Completely overhauled like new ready for work. 1738 Proctor, Dallas, Texas. Phone Elmhurst 1154, Greenwood Machine & Engineering Co.

AMERICAN Structural Steel Building, 50′ x 77′ x 10′. Excellent Condition, Location: Shidler, Oklahoma. Alfred B. Kern, 223 Wright Building, Tulsa, Oklahoma.

35 DERRICKS: Used derricks, good condition. Erected in East Texas Field. 122 ft. angle iron; 116 and 81 ft. tubular steel. Available now at bargain prices. Standard Pipe Company. 3211 Main, Dallas. Phone RIverside 6411.

DRILLING Mud. Colo. Bentonite, it swells, it jells. Few equal, none better. Send for sample. Our price saves you money. Pressey & Sons, Pueblo, Colorado.

FOR SALE: 300-400 Ampere Lincoln Welding Machine with 6-Cylinder Buda engine—200 feet lead cable. Has 50 watt, 110 volt for lights or pull grinder—¼ original price. Box 686, Maysville, Oklahoma. Phone 4251.

FOR SALE: 2—12″ 6,000# QRC Preventers skidded; 2—210 brl. National Welded Tanks; 2—60′ American Derricks, 104,000# capacity, portable in 30′ sections. Lum Price, 417 E. 16th, Houston, Texas. UNderwood 8945.

### FOR SALE

45 Star Heavy Duty Spudder complete with all tools, new Kohler light plant and hand tools. Power: 13000 cat Diesel, 60′ steel mast. New wire throughout. Herbert H. Hart, Box 34, Phone 411, Virgil, Kansas, or C. V. Cross, Phone 256, Eureka, Kansas.

### STANDARD BLACK LINE PIPE

163,000′ 1¼″ Plain Ends, 21′ Lengths
135,000′ 1½″ Plain Ends, 21′ Lengths
102,000′ 2″ Plain Ends, 21′ Lengths

FOR FULL DETAILS CONTACT:

**A. J. STRUBEL, Broker**
**SIdney 1791 (Day Phone)**
**HUdson 8152 (Night Phone)**
**4946 Murdoch St. Louis, Mo.**

### GOVERNMENT SURPLUS

Oil Suction and Discharge Hose, unused, 4″ x 25′, in factory crates, flanged or bronze coupled. 6″ x 20′, flanged both ends, perfect, in original factory wrappings.

100 KW 110-220 volt DC Generating Sets with switchboards, Superior GDB 8 150 HP Diesel Engines.

GM 671 Gray Marine Diesel Engines, parts and generating sets.

Parts for the following Diesel Engines: Superior, Cooper-Bessemer, Fairbanks-Morse, Hill, Buda, Alco, Hercules, Cleveland GM, etc.

Crankshafts for Enterprise, Cooper-Bessemer, Superior, etc.

Electro-Mechanical Steering Gears, 3 HP 115 volt DC and others.

Marine Electric Cable, armored, lead, rubber covered and coaxial, etc.

Electric AC and DC Motors, Motor Generators, Mag. Starters, Switches, Blowers, Pumps, Resistors, Rheostats, etc.

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*Most Anything in Marine Supplies*

**LET US KNOW YOUR NEEDS**

**1226 St. Thomas St., New Orleans 13, La.**
**P.O. Box 1239**

**Telephone Raymond 5526 Canal 5141**

## EQUIPMENT FOR SALE

20, 25, 35 HP S.H. Crankshafts and spare parts for Superior Gas Engines, 4-cycle. 10 x 5 x 12 and 4¼ x 4¼ x 10 Ingersoll-Rand Compressors. 14 x 10 Twin I. R. Vacuum Unit. ⅞″ SH Sucker Rods. Nolan Sales Corp., Tulsa, Okla.

FAILING rotaries, 3000′ and 1500′ capacity, mounted on International trucks. Box 214, The Oil and Gas Journal, Tulsa, Oklahoma.

BUCYRUS, Ft. Worth, Wichita spudders. Franks, Longyear rotaries. Good used Equipment. Also tools, pipe, cable. Everything for well drilling. Fishing tools rented—Pressey & Son, Pueblo, Colo.

## EQUIPMENT WANTED

NEED immediately small mounted rotary with good drill pipe not less than 2500 capacity for S. W. Wyoming operations. Transco Gas and Oil Corp., 200 N. Third St., Albuquerque, N. Mex.

WANTED: Four Class B-36 strut type 500# W. P. C. & G. Cooper Company used compressor assemblies including cylinder bases. See Cooper spare parts sheet CB-36-3. Contact Cities Service Gas Company, C. D. Rogers, P. O. Box 1162, Wichita, Kansas.

### Oil Tankage Wanted

Tankage needed by major oil company; all sizes 2500 to 96,000 barrel capacities, cone and floating roofs. Give age, dimensions, condition, general locations and prices. Box E-201, The Oil and Gas Journal, Tulsa, Okla.

## HELP WANTED

**FOREIGN and Domestic Oil Employment Directory** covering the oil industry, showing where to apply for jobs. Price $5.00. Oil Industry Mailing List, Box 2603, Tulsa, Okla.

APPLICATIONS now being received from Petroleum, Chemical and Mechanical Engineers with a Ph.D. degree and petroleum reservoir engineering experience for teaching positions on the petroleum engineering staff of a Southwestern institution. Salary based on background. Initiative essential. Interviews during July and September. Appointments effective September 1. Consulting and research encouraged. Send all data including a recent photograph to Box E-191, The Oil and Gas Journal, Tulsa, Oklahoma.

### MECHANICAL PETROLEUM ENGINEER

**with 5 or more years experience**
**For Design of Oil Field Equipment**

**UNION TANK & SUPPLY CO.**
**P.O. Box 2092, Houston 1, Texas**

## HELP WANTED

### SEISMOGRAPH

Aggressive growing contract company, wants Party chief, Computator, Operators, and surveyors, with Rocky Mountain area experience. Box E-190, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTRACTIVE opening for young Pet. Eng. for production engineering work on eastern Kansas waterflood projects. Give complete statement of qualifications, references and present salary. Brundred Oil Corp., 208 Nichols Road, Kansas City 2, Mo.

WANTED by independent oil company, young lawyer, with some experience or recent graduate. Application must be in own hand writing. Give qualifications and experience. Box E-185, The Oil and Gas Journal, Tulsa, Okla.

### LP GAS SALES ENGINEER

Eastern producer desires LP gas sales engineer preferably experienced in sales to dealers, industrial plants, and utilities. Please state full particulars and experience in reply to A-91, P. O. Box 3575, Phila. 22, Pa.

### WANTED
### Production Superintendent

by one of the oil industry's oldest and largest manufacturers.

Must be capable of directing manufacture of Oil Field Equipment, Valves and Defense Work including light and heavy machining.

This position offers additional executive opportunity to a capable man.

Salary—Good, because the man must be good.

Location—Heart of the Mid-Continent Area.

**Reply to Box E-184**
**The Oil and Gas Journal**
**Tulsa, Oklahoma**

**PROCESS ENGINEER**

Experienced in the design and operation of general and petro-chemical plants.

**ESTIMATOR**

Thoroughly familiar with all phases of refinery and chemical plant construction.

**MECHANICAL DESIGN ENGINEER**

Experienced in the design of specialties such as expellers, extractors, mixers, conveyors, elevators, etc.

Apply by mail giving education and experience record in detail; also note marital and military status. Personal interviews will be arranged for qualified applicants.

Opportunity for advancement with an expanding organization. Well defined and attractive vacation, insurance, and retirement plans.

**CHEMICAL PLANTS DIVISION**
**BLAW-KNOX CONSTRUCTION CO.**
**PERSONNEL DEPT.**
**P. O. Box 1266 Tulsa, Oklahoma**

### OPPORTUNITIES FOR TECHNICAL REFINERY PERSONNEL
for
### LARGE INTERNATIONAL OIL CO.

Entertaining applications of graduate chemical, mechanical, structural and electrical engineers for refinery engineering assignments at home and abroad.

Engineers with refinery experience and also recent graduates will be considered.

**Box E-143, The Oil and Gas Journal, Tulsa, Oklahoma**

## HELP WANTED

WANTED: Seismologist for permanent assignment division office in Tulsa. Reply Box E-166, The Oil and Gas Journal, Tulsa, Okla.

WANTED: First-class refinery mechanic. Must be experienced in gas compressor work. New Mexico Asphalt & Refining Company, Box 367, Artesia, New Mexico.

WANTED—Refinery instrument men. Cat cracking experience necessary. New Mexico Asphalt & Refining Company, P. O. Box 367, Artesia, New Mexico.

DRILLING contracting and oil producing company wants man experienced in producing and completing wells. Duties will be with both contract drilling and producing operations. Age 30 to 35 years. Area Ark-La-Tex. Replies confidential. Box E-187, care of The Oil and Gas Journal, Tulsa, Oklahoma.

AGGRESSIVE OIL EXECUTIVE — Substantial independent producing company wants aggressive, high type, responsible executive as Manager West Texas-New Mexico Division. Applicant should be under 35 years of age, 10 years experience land and geological work preferably West Texas-New Mexico area. Applicant must be equipped to find and negotiate for wildcat, undeveloped, and developed properties and leases, appraise submittals, manage present West Texas office. Excellent compensation. When replying give full details, include photograph. Our present employes not considered for this position. Box E-194, The Oil and Gas Journal, Tulsa, Oklahoma.

OPENINGS with Pipe Line Service Company, for topographical draftsmen, surveying party chiefs, instrument men, right-of-way buyers. Furnish complete details of past experience, references, age and expected salary. All replies which will be held in strictest confidence, should be addressed to: Box 1681, Shreveport, La.

**GAS ENGINEER**

For consulting organization in New York. Must be graduate engineer, be up to date technically, have 5 to 10 years experience preferably with natural gas operating utility and be qualified to make economic, operating and planning analyses. Salary range in accordance with qualifications. **Box E-192, The Oil and Gas Journal, Tulsa, Oklahoma.**

## SITUATIONS WANTED

MECHANICAL ENGINEER, experience in power and chemical plants, inspection of piping and pressure vessels, preventive maintenance, personnel, training, safety and supervision, desires position as safety and training director or maintenance engineer. Box 211, The Oil and Gas Journal, Tulsa, Oklahoma.

CHIEF CHEMIST — Presently employed, desires change. Eleven years experience in Manufacture of Motor and aviation gasoline, asphalt and road oils. Age 32. Box E-193, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER: Desires position with oil company or allied industry. Eight years experience in Plant Technical Service and Production Supervision, on Gasoline Plants Refineries and Petrochemical Plants. Box E-175, The Oil and Gas Journal, Tulsa, Oklahoma.

DRILLING Contractor operating in West Texas and New Mexico desires to contact small or medium-sized independent oil company who needs an operating manager. Personal interview desired. Twenty years experience in all phases of the oil industry. Address replies to Box D-844, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No 131. Ph. No. 131, Hobbs, New Mexico.

MECHANICAL ENGINEER: B.S. Degree, age 28, 4 years experience with major oil company in engineering capacity, production and transmission phase. Desire permanent position with major independent oil company, Texas—Oklahoma—Louisiana area. Box 212, The Oil and Gas Journal, Tulsa, Oklahoma.

## RANCHES AND FARM LANDS

# 175,000 Acre Ranch
# Southern Colorado

Famous spread in excellent condition, ready for purchaser to operate. Consists of 175,000 acres deeded, 1,000 acres meadow land. Including excellent old decreed water rights of 26, second feet. Cattle carrying capacity: 5,000 to 7,000 head year 'round. Has all the improvements of a modern small town, such as: Headquarters (of owner) 7 houses, office building, complete set of barns, sheds, corrals. Additional group of buildings with two very modern homes have their own set of barns, corrals, sheds. Excellent fishing on the ranch, also outstanding for deer, elk, bear, wild turkey hunting. At present 10,000 acres are fenced with high woven wire as a game refuge. And there's a good merchantable stand of saw timber. Located on excellent highways and railroads with practically perfect cattle shipping arrangements. Contact us immediately for any further details, price, locations, etc.

## WESTERN Realty Co.

**400 Livestock Exchange Bldg.**

**Denver 16, Colo.** **Phone: KEystone 6313**

## SITUATIONS WANTED

COMPETENT petroleum engineer with practical experience in oil and gas production, well completion, and work-over work. Reservoir experience. Age 33. Box 213, The Oil and Gas Journal, Tulsa, Oklahoma.

FORMER Independent Oil Operator ten years, with legal education, plus eight years Wall Street experience, desires connection raise funds exploratory well drilling from excess profits taxpayers. Box D-838, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER: Age 31, single, no military status, 9 years experience. Desires responsible position Gulf Coast area crude sales and purchasing or marketing products. Full knowledge refinery operations. Very personable with numerous contacts. Box E-206, The Oil and Gas Journal, Tulsa, Oklahoma.

## LEGAL BLANKS

BURKHART LEGAL BLANKS since 1908. Oil-Gas (all states), Business, Real Estate, Legal Forms, Leases, Revised With Government Regulations, Commercial Printing. Catalog and Samples on request. Burkhart Printing & Stationery Company, 115 South Cincinnati, Tulsa 3, Oklahoma

## RESORTS

The RANCH LIFE in TEXAS

Outstanding Dude Ranch - scenic hill country - deluxe cottages - swimming pool - riding - hunting - fishing - sports. Modern Airport, complete aviation service.

Write for folder, rates. Flying L Ranch BANDERA, TEXAS 50 miles Northwest of San Antonio

## EXPLORATION SERVICE

### CORE HOLES

We core hole your acreage with up-to-date equipment. If desired, we do surface and subsurface mapping and run electrical surveys in connection with your coreholing program.
Service anywhere in the United States. Our work is fast, efficient and CONFIDENTIAL.
Contact us for terms and other information.

**EL DORADO DRILLING CO.**
**Box 527, El Dorado, Arkansas**

## RANCHES AND FARM LANDS

135,000 ACRES, Tampico district, formerly Empire Oil & Gas Co. lease. Best ranch and agricultural land in coastal Mexico. Price $1.00 per acre. Box 2135, Abilene, Texas.

NORTHERN MEXICO RANCHES
Buy well improved stocked with herefords ranches $5 per acre with cattle. Wonderful deal for big capital. Proof of ability to buy required. Jack Bermingham, Box 2135, Abilene, Texas.

FEE LAND: Fifty Thousand acres with minerals and timber in Tennessee. Four dollars per acre. Terms may be arranged with responsible party. Box 209, The Oil and Gas Journal, Tulsa, Oklahoma.

## BUSINESS OPPORTUNITIES

FOR SALE: Tungsten mine 21 claims large tonnage in sight. Inspected and O.K.'d for government loan—approximately 10 miles from railroad. Box E-204, The Oil and Gas Journal, Tulsa, Okla.

INVESTMENT, plus speculative deal. For $100,000. This will include production to pay 6% from the beginning, balance of capital to be used as venture money. This in the shallow fields of south central Kentucky. The offerer has experience in the area, has ability, but not capital. Open to investigation. Can show action. Money not used for expenses but for operations. This is to parties or companies who have available monies to get long time earnings with a large degree of safety for return, plus chance of large profits. Details on request. P. O. Box 868, Bowling Green, Ky.

## WANTED

WANTED: Producing, non-producing leases, royalties, lands, $2,500 to $1,000,000; also water floods; from owners, brokers. Give price; description, first letter. American Oil Co., Box 38, Houston.

CAPITAL needed for acquisition and development of oil properties with merit. Box 210, The Oil and Gas Journal, Tulsa, Oklahoma.

## GIFTS

**TITANIA GEMSTONES**

**Can supply the sensationally beautiful Titania gemstones, the only thing on earth more brilliant than the diamond; all facet cut and at a small fraction of the cost. Please that little lady with one of these marvelous gems. Ask for description.**

**C. C. Boak, Tonopah, Nevada**

**LEASE AND DRILLING BLOCKS**

OHIO Berea shallow wells and acreage. 700 ft. natural, will flood. E. N. Rehler, Allegany, N. Y.

FOR SALE: Oil and Gas Leases and Drilling Propositions on leases adjoining producing leases. Depth of Drilling 500 to 700 feet. W. P. Harley, Bowling Green, Ky.

OIL Leases in Trigg County, Ky., surrounding drilling well, just started. Priced to sell. (Geology L.V.I.) C. P. Taneyhill, Industrial Engineer, P.O. Box 304, Bowling Green, Kentucky.

WILL act as your buying agent for oil and gas leases and royalties in the Mid-Continent and Southeastern States fields. C. W. Deming, P. O. Box 1874, Tulsa, Okla., or Box 320, Waycross, Georgia.

FOR SALE: Clinton gas well. Oil in stray sand. Inquire W. E. Schrock Tire Shop, Millersburg, Ohio.

FOR SALE: 640 acres Big Horn County, Wyoming (very hot); 20,000 acres in Central and Eastern Montana (scattered counties); 20,000 acres, North Dakota; 30,000 acres, South Dakota; 10,000 acres, Colorado; 30,000 acres, Nebraska (scattered counties). Prices and terms to properly interested parties. Dyer O.J. 1835 Champa St., Denver, Colorado.

SCURRY CO., Etc.: Have suburban lots in Snyder, Stanton, Lott, Quannah, Texas. Want development for oil and gas. V. A. Epps, Pioneer Hotel, Tucson, Arizona.

WANTED: Proven West Texas leases. Will pay cash and override. Box 2626, Odessa, Texas.

FOR lease on one-eighth basis for oil and gas 100,000 acres on the Cumberland Plateau in Tennessee for test drilling. This plateau is a part of the Appalachian Coal oil and gas field, and is Tennessee's coal basin. Both oil and gas is being produced from wells nearby. G. E. Harrison, owner, Crossville, Tennessee.

SOLICITING cooperation of drilling contractors or operators with shallow rotary equipment capable developing zones from 1300 feet to 3500 feet to participate in drilling program. We own approximately 10,000 acres government and fee leases, LaBarge field, Lincoln and Sublette Counties, Wyoming. North block offsets Texas Co. production which produced over 12 million barrels very shallow depth to date. General Petroleum's well north our properties tested 100 barrels per day 55 gravity oil from nugget formation, and now drilling second well. Carter, Stanolind have spudded in test well east our block. Predecessor operators obtained estimated gas potentials ranging from 30 million to over 100 million cubic feet per day at about 2000 feet, on and adjacent our leases. Offered substantial figures for shooting options for deep zones from major oil companies. Transco Gas and Oil Corp., 200 N. Third St., Albuquerque, N. Mex.

**SEVERAL LARGE LEASE BLOCKS**

**$1 per acre up—also drilling blocks and scattered leases, Crosby, Floyd and other West Texas Counties.**

**P. O. BOX 1984, ABILENE, TEXAS**

**S. E. NEW MEXICO**

Wells drilled into San Andreas (Permian) lime indicate flowing production in 3 oil zones. S W Roosevelt County. Also deep sand possibilities in this major area. Drilling wells under way. We recommend leases or royalty on structure. Details on request.

**W. J. PETERMAN, GEOLOGIST**
**Portales** **New Mexico**

**LEASES ROYALTIES**

**Producing and Nonproducing**
**Bought and Sold—Any Area**
**Inquiries Invited**

**B. D. BUCKLEY**
**6635 Delmar Ave., St. Louis 3, Mo.**

**LEASE AND DRILLING BLOCKS**

DESIRE finance to re-drill old Brown County shallow pools. W. H. Mahon, P. O. Box 821, Brownwood, Texas.

WILL trade new pipe for interest in proven well. Write Box 2626, Odessa, Texas.

**ROYALTIES**

DEEDED ROYALTIES
San Juan Basin & Permian Basin. Write Harry S. Wright, Wright Bldg., Farmington, New Mexico.

MONTANA ROYALTIES
Millions of acres now leased by world's major companies, with huge drilling play in prospect. For booklet describing Montana geology and oil development, write Landowners Royalty Company, Box 1225, Great Falls, Montana.

LOCAL CAPITAL FOR
production, producing royalties, over-rides, oil payments, drilling deals, working interests, large or small. Must have merit. Prompt action. Give full details. Box E-161, The Oil and Gas Journal, Tulsa, Oklahoma.

**PRODUCING ROYALTIES**
**WANTED**
**ANY AREA**

**BERN SECURITIES CO., INC.**
**111 Broadway** **New York 6, N. Y.**
**WOrth 4-7546**

**PRODUCTION SOURCE**

PRODUCTION BUYERS
Valuation Geologist experienced in checking properties for bank loans desires to represent company looking for production in Oklahoma. Box 211, The Oil and Gas Journal, Tulsa, Oklahoma.

**PRODUCTION FOR SALE**

FIFTY ACRES producing oil royalty and three leases making 110 barrels daily production. Liquidation of estate. P. O. Box 26, Tulsa, Oklahoma.

**REAL ESTATE**

MODERN well-planned homes in restricted district. Residential, commercial and industrial properties. Clem Casey, Bismarck, N. D.

**COLLECTORS**

ATTENTION gun collectors. Mexico Gun collection, 4,000 guns all in working order, rare items all types and makes. Jack Bermingham, Box 2135, Abilene, Texas.

# EQUIPMENT MEN

*(Continued from page 137)*

well-equipped lining shop in the Southwest.

Sheet rubber stock based on a large number of natural and synthetic-rubber compositions will continue to be calendered at the Mertztown, Pa., plant but all types of linings will be installed at the Texas plant.

## Surmacz Appointed Chief Industrial Engineer

Harnischfeger Corp. has named Joseph G. Surmacz to the newly created position of chief industrial engineer, as announced by Herman Menck, vice president and works manager. Surmacz will be in charge of production control.

Surmacz was formerly chief industrial engineer with Ingersoll steel division of Borg-Warner, Chicago, and American Steel & Wire, Pittsburgh.

Surmacz has appointed David A. Drewery to assist as plant industrial engineer. Drewery will supervise work methods, time study, job evaluation, and cost analysis. He formerly served as plant industrial engineer with Chevrolet Motors and United States Steel Corp.

## Matthews Joins Equipment Division of Mud Products

E. R. Albert, Jr., president and general manager of Mudco, Inc., recently announced a series of additions in sales personnel of the firm.

*R. R. MATTHEWS*

*W. W. CARSON*

R. R. (Lefty) Matthews has become associated with the equipment division and will be connected with the sale of Mudco O-Ring butterfly valves, and direct and coordinate the sales activity of Mud Products equipment representatives in all districts. Before becoming associated with Mud Products, Matthews was located at Great Bend as Kansas district manager for Ideco.

W. W. (Kit) Carson, field representative at Woodward, Okla., has been transferred to the company's headquarters at Tulsa, where he will be connected with the sale of Baroid products in that area.

Appointed as joint agents for the sale of Mudco O-Ring butterfly valves in the West Texas and New Mexico area are R. Q. (Dick) Swindler and Harry W. Denton, with headquarters and warehouse at Odessa.

## Dowell Names Walther Head of Cathodic Sales

Herb Walther, Jr., development engineer for Dowell Incorporated, Tulsa, has been placed in charge of the sales of cathodic-protection products for retarding electrolytic corrosion of pipe lines and industrial equipment.

Walther formerly worked with the industrial division in Richmond, Va. He has been associated with Dowell since 1944, and was previously with Brooklyn Union Gas Co.

Special representatives for the cathodic-protection division have been established in Dowell's Chicago and New York offices. William E. Bunting, with Dowell since 1944, has been named development engineer in Chicago. Richard W. Stetson, with Dow-

ell since early in 1948, is cathodic-protection representative in New York City.

## B & W Appoints Three New Representatives

Kenneth A. Wright of B & W, Inc., returned from a trip to Canada, where the Import Tool Co., Ltd., Calgary, Alta., owned and operated by Delbert D. Lewis and son, Delbert D. Lewis, Jr., has been selected as its Canadian distributors. The firm will maintain stocks at Calgary and Edmonton and will provide field delivery and installation service.

James E. Enrick Co., Casper, Wyo., has been appointed Rocky Mountain distributors for B & W scratchers and centralizers. Stocks of this equipment will be warehoused at Casper and at supply stores in active drilling areas, including field-installation service.

Field warehouse stocks of B & W products have been established at Vacuum Truck Service Co., C. A., headquarters in El Tigre, Venezuela, which is owned and operated by Jack Bryan.

## Hinderliter Names Three New Manufacturer's Agents

Equipment Sales Co., Hobbs, N. M., has recently been formed by A. L. Long and J. R. Wilson. Long has been associated with supply companies since 1936. He has been affiliated with Bridgeport Machine Co., Oil Well Supply Co. and Jones & Laughlin Supply Co. Wilson has been with several producing companies in West Texas and the Gulf Coast, as well as Axelson Manufacturing Co. in West Texas. Equipment Sales is now agent on well-head equipment in the Permian basin for Don R. Hinderliter, Inc., Tulsa.

C. J. Baeten, Wichita, has been representing Don R. Hinderliter on well-head equipment for the past year, and Baeten has been a manufacturer's agent for the past 15 years.

L. E. Van Winkle, Abilene, Tex., is covering the Panhandle and North-Central Texas as a manufacturer's agent for Don R. Hinderliter.

## Avondale Purchases Stock in Service Foundry, Inc.

J. H. Bull, president, Avondale Marine Ways, Inc., has announced the purchase of all outstanding stock in Service Foundry, Inc., New Orleans. At a meeting held in the offices of Service Foundry, a new board of directors, consisting of J. H. Bull, chairman; James Viavant, H. G. Koch, Hettie Dawes, and Henry Z. Carter, was elected.

The board appointed the following officers: J. H. Bull, president and general manager; H. G. Koch, vice president; James Viavant, secretary-treasurer; Hettie Dawes, controller; Henry Z. Carter, assistant general manager; and Ben Peters, plant manager.

## Continental Tank Establishes Sales Offices in Tulsa

New sales offices for Continental Tank Co., Inc., Oklahoma City, have recently been opened in Tulsa, according to an announcement made by Guy O. Marchant, president.

Ernest E. Storey has been named sales reprsentative of the Tulsa offices.

Continental Tank manufactures welded-steel tanks, bolted-steel tanks, high and low-pressure separators, and a complete line of emulsion treaters.

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## Kentucky Fields

(Continued from page 131)

### WESTERN KENTUCKY WILDCAT FAILURES

Daviess County: Dale Hopkins 1 Boyle, NW NE NE SE 23-O-26, dry, TD 2,416 ft.

McLean County: Chester Oil Co. 1 Bidwell, SE NW SW NE 11-L-28, dry, TD 1,715 ft.

R. E. Hupp et al 1 Cochran, W½ SW SE NW 2-M-28, dry, TD 2,325 ft.

Ohio County: Harry School 1 Hamilton, SL NE NE NE 1-M-30, dry, TD 965 ft.

Earl Briney et al 1 St. Clair, NW SE SW NE 8-M-33, dry, TD 922 ft.

Webster County: Iley Browning & Sons 1 Brown, WL NE NW SE 14-N-23, dry, TD 2,741 ft.

### EASTERN KENTUCKY

ASHLAND.—In the Springfork pool of Breathitt County, and located on Hawes Branch, United Carbon Co. recently completed 29 E. J. Evans fee for a combination oil and gas well. A test in the Big lime formation at 1,605-1,725 ft., gaged 179,000 cu. ft. of gas daily, while the Weir sand at 2,053-2,116 ft., made 2 bbl. of oil. Total depth is 2,116 ft.

In Big Sandy gas field (Pike County sector), United Carbon got a good gas well at 1766 Hatler Meade. From the Devonian black shale at 2,690-3,170 ft., total depth, it had an initial open flow of 2,374,000 cu. ft. of gas, natural. In the same sector of the field, Columbian Fuel Corp. completed 1 Floyd Justice for 403,000 cu. ft. of gas daily from the Big lime formation at 1,996-2,221 ft., total depth.

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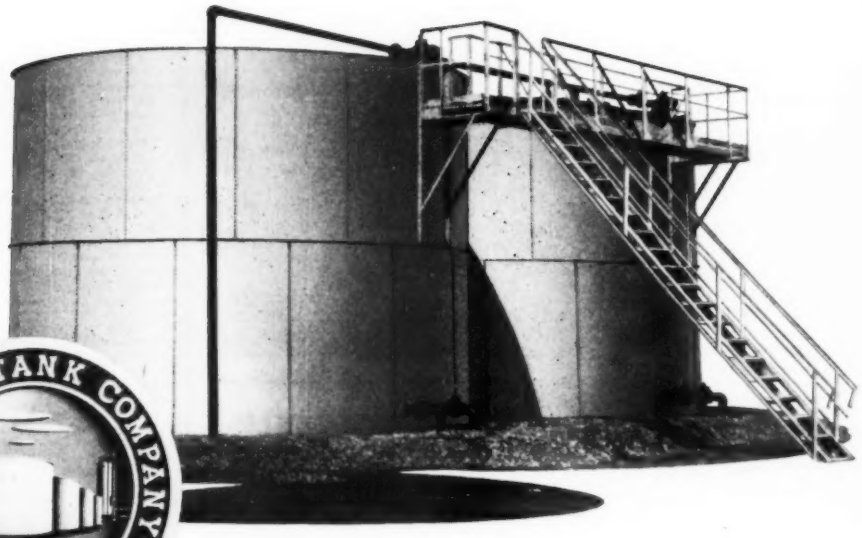

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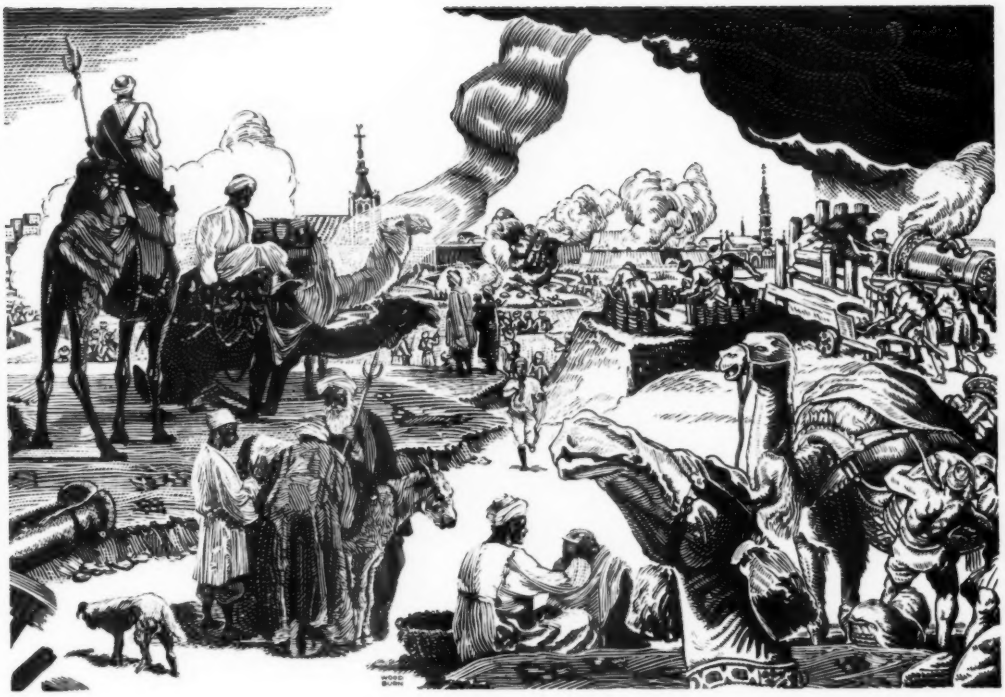

# Steel saved civilization at Vienna

MODERN history begins with the record of conflict between Christians and Moslems--six centuries of wars that opened with the Crusades and saw the Turks capture Constantinople in 1453.

More than 100,000 Turkish janizaries and cavalry besieged Vienna in 1683. For two months, to quote the diary of an eye witness, "The enemy continued playing their cannon and granadoes. But the city walls were strong, Christian cannon were bigger and more numerous and ammunition more plentiful." Finally came a day when the officer's journal reported, "The enemy did not play their cannon so fast. It was confirmed that they had no great provision of bullets, inasmuch as they shot back not only our bullets, but also pummels of swords and all sorts of iron and stones."

At last a great Christian relief army was assembled. "They made an attack in the best order that ever army did. The enemy, forced always to give back, were put all into confusion. They betook themselves to flight, leaving all their provisions, ammunition, cannons and tents --the greatest part rendered unfit for farther use by our great guns."

Never again did the Turks seriously menace Christendom. Western civilization had been saved once more by its supremacy in the use of iron and steel. To aid our survival America's free private industry is producing steel at the highest rate ever known--and still expanding. The question remains--Will America use enough of this tremendous steel production to guarantee the continued supremacy of Western, Christian civilization?---We believe the answer is yes!

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